AGRICULTURAL *Chemicals*

IN THIS ISSUE:

OCTOBER, 1957

Technicians at Spencer's mixed fertilizer demonstration plant prepare to make adjustments on a single-deck screen. Equipment in the plant enables Spencer to use any commercially available raw materials and produce any analysis that is commercially feasible. Read below what Spencer is doing to help you produce better mixed goods at lower cost.

WANTED: problems to solve for fertilizer manufacturers

Are you interested in ways to produce better mixed fertilizer at lower costs?

Would you like to know what is being done to overcome the problems of producing certain grades of fertilizer in granular form?

Is corrosion a problem in your plant?

If your answer to any of these questions is "yes," then you stand to profit from experiments now going on at a pilot-size fertilizer plant recently constructed by Spencer Chemical Company, makers of SPENSOL Ammoniating Solutions.

Located near Pittsburg, Kansas, this pilot plant has already made significant progress toward solving many problems commonly encountered by manufacturers of mixed fertilizer.

Of particular interest are the results of tests to find ways to overcome problems of producing such fertilizer grades as 5-20-20 and 6-24-12 in granular form.

Spencer technicians are also experimenting with new raw materials which may be worked into existing formulations.

In another study now under way, Spencer people expect to find ways to eliminate or greatly reduce the problem of sparger corrosion which prevails in so many plants today.

Spencer does not produce mixed fertilizer—and has no intention of doing so. But as a producer of nitrogen materials for the fertilizer industry, Spencer is interested in helping manufacturers develop better products at lower cost.

Whether or not you, as a fertilizer manufacturer, use SPENSOL in producing mixed fertilizer, the results of these and other tests are available to you as they are published. If you would welcome information of this kind, just write: Spencer Chemical Company, Agricultural Technical Service, Dwight Building, Kansas City 5, Mo.

Many fertilizer manufacturers and plant managers are visiting Spencer's new pilot fertilizer demonstration plant in person to see first-hand what is being accomplished. If you, too, would like to see this plant in operation and discuss a specific problem with our technicians, just tell your Spencer salesman or technical service representative. He will be glad to arrange a time for your visit.

SPENCER

SPENCER CHEMICAL COMPANY, Dwight Bldg., Kansas City 5, Mo., District Sales Offices: 412 Candler Bldg., Atlanta, Ga.; First National Bank Bldg., Chicago, Ill.; Union Planters National Bank Bldg., Memphis, Tenn.

America's Growing Name in Chemicals

This Month's Cover

Snaps at the NAC Meeting

(1) Mr. and Mrs. Mel Clark, Frontier Chemical Company.

(2) S. L. Harris, Monsanto Canada; Fred Hatch, Shell Chemical Corp.; W. W. Allen, Dow Chemical Co.; G. C. Romig, American Chemical Paint Co.; Lou Gemmell, Geigy Agricultural Chemicals.

(3) Lee Hudson, California Spray-Chemical Corp.; Roger Roth, Velsicol Chemical Corp.; Jack Moore and Ken Krausche, Floridin Company; Al Fuchs, Atlas Agricultural Chemicals; P. J. Reno, Hercules Powder Co.

(4) Mr. and Mrs. Walker, Frontier Chemical Co.

(5) Fred Hatch presenting certificate to K. P. Ewing.

(6) Ray Cooney, Flag Sulphur & Chemical Co.; C. O. Barnard, Western Agricultural Chemicals Assn.; Paul Torpin, McLaughlin Gormley King.

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AGRICULTURAL *Chemicals*

ARTICLES

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IT pays to protect the food value of corn — as it goes into storage. That's the only sensible way to protect its market value.

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There is no effect upon the odor or taste of foods prepared from corn which has been treated with Pyrenone. Hence local mills can grind it into grits and meal for human consumption.

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To protect hybrid seed corn against insect infestations, today's progressive seed growers apply a slurry made of Pyrenone O. F. 75-7.5. Seed corn treated with this slurry, and left over after the planting season, may be fed to farm animals with no ill effects whatsoever.

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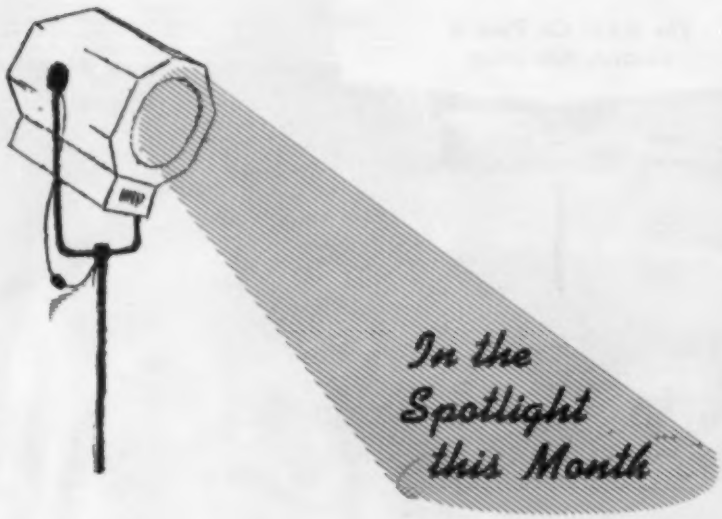

- **Caking in Fertilizer** . . . Although granular fertilizers are much less subject to caking than are non-granular fertilizers, granulation is not a complete cure for caking problems. A review of such factors as size and shape of particles, moisture content, formulation, conditioners, etc., and their effect on caking. Page 38.

- **New Pesticides** . . . The organophosphorus pesticides, Phostex and Nialate were discussed at the annual ACS meeting, and reported to show considerable promise in the control of various deciduous fruit pests. Page 34.

- **Press Relations** . . . A review of a series of articles in the *Milwaukee Journal* concerning pesticide spray programs. Page 45.

- **NAC Elects Vernon** . . . At its annual meeting, NAC elects Jack Vernon to succeed Fred Hatch as president; Charles Sommer is elected vice president. K. P. Ewing and W. G. Reed who recently retired USDA posts, are honored by the pesticide industry. Page 28.

- **Dow ET-57 for Torsalo** . . . Oral administrations of Dow ET-57 to cattle indicated the product is an active systemic agent for killing the larvae of *Dermatobia hominis*, although it is not so effective against this pest as it is against the *Hypoderma* larvae. Page 51.

- **"No tickee — No laundly"** . . . William Prigmore describes the cash—no credit policy of Eastern States Farmers Exchange, and its success in getting farmers to pay cash for their purchases. Page 43.

- **About Soil Sterilants** . . . A review of the general characteristics of some common groups of soil sterilants, including the arsenicals, sodium chlorate, the borates, and urea herbicides was among the subjects discussed at the recent annual meeting of the Canadian Agricultural Chemicals Association. Page 40.

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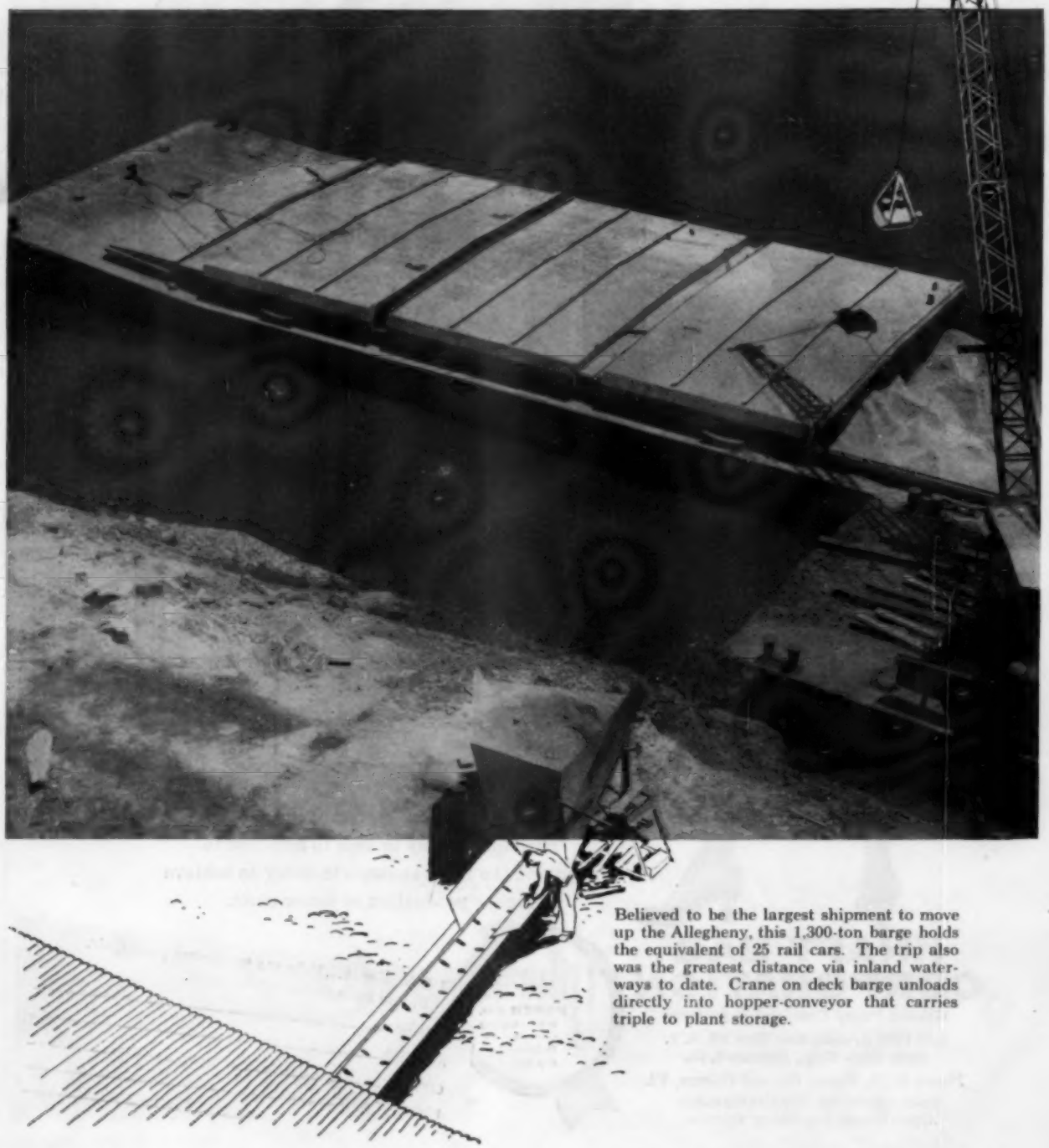
FIRST BARGE SHIPMENT OF UNLOADS AT EASTERN STATES'



Believed to be the largest shipment to move up the Allegheny, this 1,300-ton barge holds the equivalent of 25 rail cars. The trip also was the greatest distance via inland waterways to date. Crane on deck barge unloads directly into hopper-conveyor that carries triple to plant storage.

TRIPLE SUPERPHOSPHATE KITTANNING PLANT

International's water-routing pioneers another first; pushes barges up the Allegheny River to slash shipping costs

When this 1,300-ton barge of triple tied up at Kittanning, Pa., shipping history recorded another first . . . and costs at the Eastern States Farmers' Exchange plant took a substantial drop.

"International has proved that barge shipments to Kittanning are practicable," said J. Raymond Myers, production manager of Eastern States' Fertilizer Department. "This shipment of triple super brings immediate savings in shipping costs —savings that our plants at Cambridge (Mass.), York (Pa.), and Wilmington (Del.) already have been realizing."

For International, the 2,400-mile trip up the Mississippi, Ohio and Allegheny Rivers was a typical venture in water-route pioneering . . . still another example of service tailored to a customer's needs.

Why not share the benefits of International's attention to service and delivery . . . plus superior product quality. Write or wire for full information.

We'll be getting more of our triple by barge," says Kittanning plant manager Curtis H. Kelso, shown here examining International's barge-shipped triple. Consistent, uniform particle size keeps dust and setting-up problems to a minimum.

Eastern States has been a leader in high-analysis mixed goods. J. Raymond Myers, production manager of Fertilizer Department, right, and Clyde F. Grimm, manager of the York plant, check texture of their granular 8-16-16 fertilizer.

INTERNATIONAL MINERALS *International* **& CHEMICAL CORPORATION**

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GRAFLOW is a conditioning agent for fertilizer that is paying for itself many times over in efficiently operated fertilizer plants. Added, as an ingredient, in either pulverized or granular form, GRAFLOW substantially reduces corrosion of the equipment in the mixing cycle. GRAFLOW reduces caking, and it increases flowability of your product.

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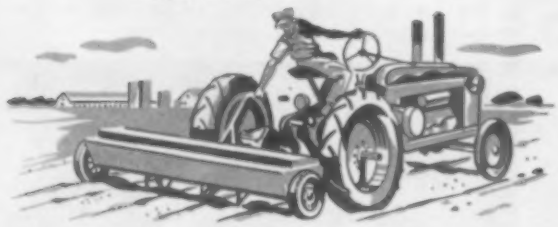
GRAFLOW is basically one of nature's finest lubricants and coating agents. Because it so greatly improves handling and reduces wear and corrosion in farm-fertilizer-spreading-equipment, GRAFLOW can provide an additional and effective sales and advertising advantage to your product. Write to our Chemical Development Department for complete information.



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GTS*

*DAVISON Granulated Triple Superphosphate

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IDEAL FOR FORMULATIONS—Because it is easy to blend. Excellent for alkaline goods and especially recommended for O-25-25.

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UNEXCELLED QUALITY—Because of Davison's more than century of experience in fertilizer formulation DAVISON Granulated Triple Superphosphate is the standard by which all other granulated products are compared. It is guaranteed to satisfy you on every count.

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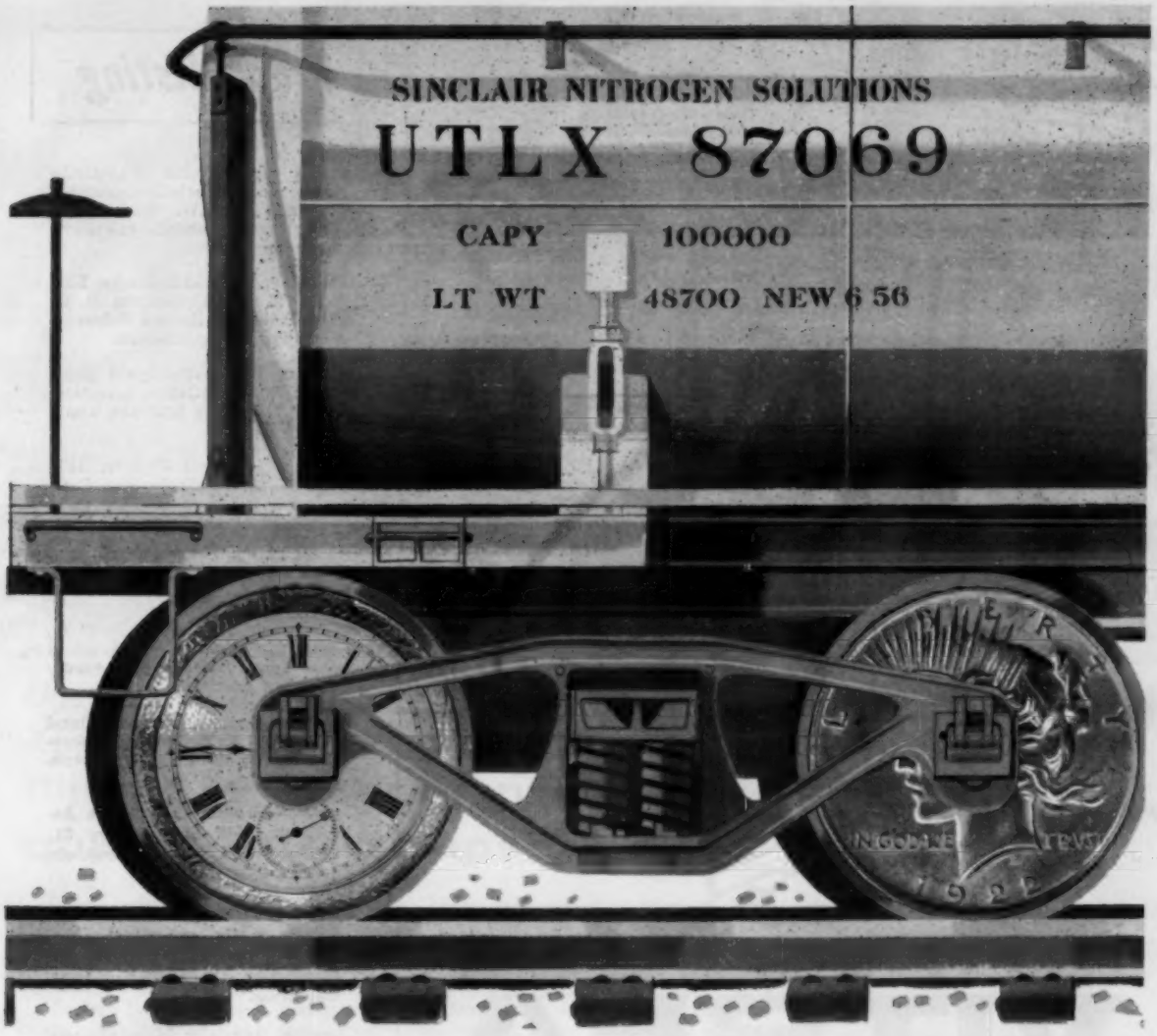

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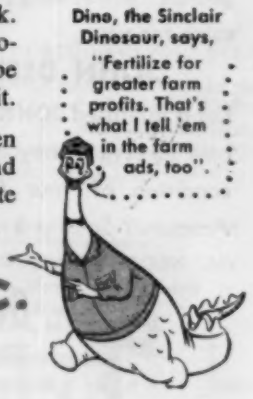
A big, new nitrogen plant at Hammond, Indiana, is in the center of the nation's rail and truck transportation network. Large storage facilities in this key location mean that your order can be filled for fast delivery when you need it.

For fast, low-cost delivery of nitrogen solutions, anhydrous ammonia and aqua ammonia call on Sinclair. Write or phone . . .



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Trade Listing

National Agricultural Chemicals Association, Association Building, 1145 19th St., N.W., Washington, D. C. Lea Hitchner, executive secretary.

National Plant Food Institute, 1700 K St., N. W., Washington, D. C. Paul Truitt and Russell Coleman, executive vice-presidents.

American Phytopathological Society, S. E. .A. McCallan, secretary, Boyce Thompson Institute, Yonkers, N. Y.

American Chemical Society, 1155 16th St., N. W., Washington, D. C.

Association of Official Agricultural Chemists, P. O. Box 540, Benjamin Franklin Station, Washington, D. C., William Horwitz, secretary-treasurer.

Agricultural Ammonia Institute, Hotel Claridge, Room 305, Memphis, Tenn., Jack Criswell, executive vice president.

American Society of Agricultural Engineers, F. B. Lanham, secretary, 505 Pleasant St., St. Joseph, Mo.

Carolinas-Virginia Formulators Association, 516 S. Salisbury St., Raleigh, N. C. J. B. Maddrey, executive secretary.

California Fertilizer Association, Sidney Bierly, executive secretary, Suite 1, Boothe Building, 475 Huntington Drive, San Marino, California.

Chemical Specialty Manufacturers' Association, 110 East 42nd St., New York City, Dr. H. W. Hamilton, secretary.

Entomological Society of America, 1530 P. Street N. W., Washington, D. C., R. H. Nelson, secretary.

Mid-West Soil Improvement Committee, 121 West Wacker Drive, Chicago 1, Ill. Z. H. Beers, executive-secretary.

National Nitrogen Solutions Association, 2217 Tribune Tower, Chicago, Ill. M. F. Collie, secretary.

National Cotton Council, PO Box 9905, Memphis, Tenn.

Weed Society of America, W. C. Shaw, secretary, Field Crops Research Branch, Beltsville, Md.

Western Agricultural Chemicals Association, Charles Barnard, executive secretary, 2466 Kenwood Ave., San Jose, Calif.

One machine to handle
ALL bulk and bagged materials

Illinois fertilizer plant buys Michigan's quarry-proved dependability

To everyone who uses material-handling equipment, the problem of dependability is a critical matter. It becomes absolutely vital, though, when you're like Hoover Soil Service of Gilman, Illinois.

Hoover's problem was to find a machine which *by itself* could handle *all* material in their bustling 20-year-old fertilizer plant. It had to be fast and versatile and, above all, as trouble-free as possible. Their study of available units included the usual comparison of specs, talks with salesmen and users, pricing, and so on.

Power Shift, Torque Converter

"Our ultimate choice was a Michigan Tractor Shovel!" says Owner Roy Hoover.

Loading bagged mixed fertilizer onto truck, Michigan often lifts 18 bags (1,440 lbs) at once.

"There were lots of reasons. But the clincher came the day we learned that our neighbors, Lehigh Stone Company of Kankakee had changed to Michigans and were very happy with them. If a Michigan could work satisfactorily under the constant use of their quarry, we reasoned it certainly would do well on our less-punishing job. The size we wanted, Michigan's 15 cubic foot Model 12B, we noted had many of the same design features as the larger quarry-model Michigans (including power-shift, torque converter, planetary axles). So we got it —and it's done even better than we hoped."

Drives safely, quickly in traffic

Today the 44 hp, 11 mph Michigan does *all* handling and *all* lifting not only at Hoover's main plant but also at their auxiliary warehouse four blocks away. Trips back and forth take only two to five minutes despite necessity to travel along the town's busy main street (U.S. 54-45-24).

Easily maneuvers through 5′ door

Unloading boxcars is a typical job. Average 50 ton car requires less than 100 trips for complete unloading, according to Owner Hoover. *"Michigan has no trouble getting in or out of any single-door car,"* he adds, *"regardless of whether it has a 5-foot or 6-foot door.* Our bucket has been extended two inches, too, over the standard bucket."

Feeds mixer, lifts bags, spots cars

Other Michigan jobs include stockpiling bulk phosphate, potash, urea and other raw materials and feeding the one-ton mixer. Michigan also hauls bags of mixed fertilizer. It loads both bagged and bulk material onto trucks. It spots boxcars, one or two at a time, both loaded and empty. Despite its heavy work schedule a simple maintenance program has reduced downtime to practically zero.

See 12B in action in your plant

Dependability and versatility like this are features of *every* Michigan Tractor Shovel. Let your Michigan distributor help you pick the size best suited to your needs: 6 cubic *feet* to 5 cubic *yards.*

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This Ful-Gusset* bag with a 9" gusset holds 50 lbs. of CYFOR† Drylite Rosin Size, a very light material requiring a bag of large volume. Both bags take the same space on the pallet.

**Developed at the request of the American Cyanamid Company*

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Micro-Cel*, a new line of synthetic calcium silicates, has extremely high absorptive properties. It is this remarkable capacity for absorption that makes it possible to prepare wettable powders with higher concentrations of dry, viscous or liquid poisons. Micro-Cel's absorption also means that more lower cost diluents can be used. Thus high strength formulation costs are now cut to a new low.

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Micro-Cel is another development of Johns-Manville Research. Combining high absorption, large surface area, small particle size and excellent dry flowability, it offers a unique combination of properties for insecticide formulation and other process needs.

Sample quantities and carload shipments are now available. Write for further data and sample formulations for poisons of interest to you. Or ask a Celite engineer to help you adapt Micro-Cel to your particular requirements and specifications.

*Micro-Cel® is Johns-Manville's new absorbent-grinding aid designed specifically for the insecticide formulator.

Johns-Manville

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- isobutyric acid
- 2-ethyl hexoic acid
- ethyl alcohol
- isobutyl alcohol
- 2-ethyl isohexyl alcohol
- 2-ethyl hexyl alcohol
- isobutyronitrile
- manganese sulphate (Tecmangam)
- triethyl phosphate

...ANIMAL FEEDS

Tenox BHT—Agricultural Grade: A form of BHT specially prepared for feed use—free-flowing, non-dusting, and granulated in a particle size comparable to that of other feed components. Protects vitamin content of feeds, improves pigmentation and protects chicks against deficiency diseases such as encephalomalacia.

Tecmangam: Contains 75-78% manganese sulphate. Completely soluble and readily assimilated, Tecmangam is an ideal source of manganese for feeds. In manganese-deficient areas, Tecmangam can be added to fertilizer to supply this essential element.

For information, samples or specifications on any of the Eastman basic chemicals for use in herbicide, pesticide and feed production, write to any of the sales offices listed below.

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B. E. Paulsen, purchasing agent for Russell-Miller Milling Co., Minneapolis, Minn.

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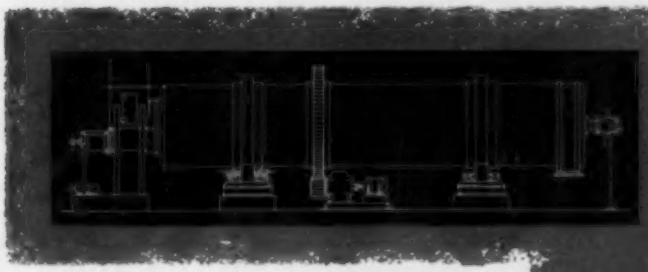

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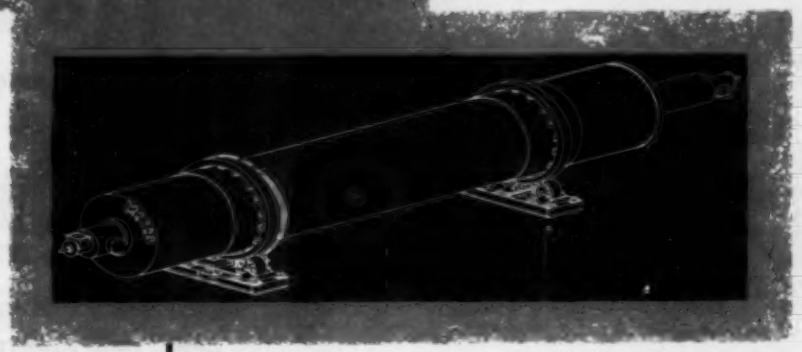

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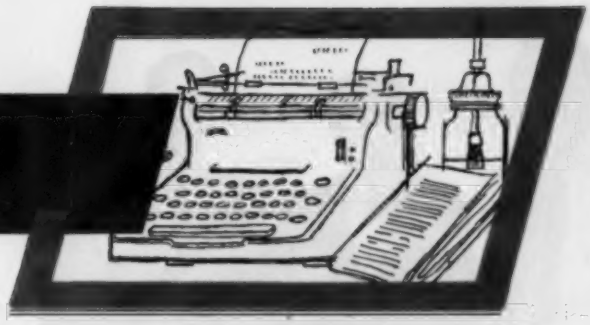
EDITORIALS



IT was predicted rather freely back a few years ago, when the Miller Amendment was being discussed, that its adoption might sharply restrict future progress in the development of new pesticides. It comes as no surprise then to those in the pesticide industry that this predicted result has, in fact, materialized. As a matter of practical economics, what it amounts to is that running a potential new product through the whole gamut of toxicological work, is so expensive that unless a candidate material shows really exceptional promise it does not pay to make the rather substantial investment in test work. Those in better position than we are to evaluate the figures involved tell us that unless a new product figures to reach a sales volume in the neighborhood of ten million dollars annually, it is just too risky to spend the money for the toxicological work required.

We have heard over the past few months of several relatively promising new agricultural insecticides that have been pigeon-holed for this very reason. More recently we learned that a concern which has developed another promising new product is restricting its domestic sale to use on ornamentals and fibers, and will offer the product for application on food crops only in the overseas market where the toxicity requirements are not so strict. For the future we may find more and more of our developments in the pesticide field originating abroad, or at least much of the introductory testing and use being performed there.

Still another idea currently attracting considerable interest in the chemical industry is to have major work in the field of basic research done overseas. In addition to freedom from the close restrictions that sometimes face the research chemist in the U. S., there is the point that Ph.D's command a much lower salary overseas, while the basic research project itself is of course unable to distinguish between an American-trained scientist and his overseas counterpart.

In the long run this loss of leadership in the sciences could be serious and costly. It is certainly to be hoped that future American progress in scientific fields, particularly in the field of pest control, will not be unnecessarily handicapped by even more stringent ground rules.

EVERY time we hear one of those reports that details how some farmer in the corn belt doubled or tripled his yield rate by an efficient application of fertilizer at the optimum level, getting $862 worth of added crop from an investment in $119 worth of fertilizer, the idea suggests itself that the fertilizer industry should be able to finance some selected test experiments, get its money back out of the yield increases, and at the same time let the experiments serve as a convincing demonstration that use of more fertilizer really pays big dividends.

Just thinking out loud, we can visualize a revolving fund set up by the industry—fifty or a hundred thousand should be adequate—with four or five hundred test farms, selected of course from lands that had not been adequately fertilized in the past, to give optimum application rates their best opportunity to register a big percentage gain in crop yield. Fertilizer would be supplied the farmer with no cash investment on his part, but he would be required at the end of the season to turn over half of his increased crop yield as compared with his average yield per acre for the previous five year period

(*Continued on Page 90*)

NAC officers: Retiring president Fred Hatch; newly elected president Jack Vernon; and vice president Charles H. Sommer.

Credit . . . Economics —theme of NATIONAL

WHAT makes farmers buy pesticides? . . . and how do you get them to pay cash? were among the questions receiving maximum attention in discussions at the annual meeting of the National Agricultural Chemicals Association, held September 4-6 at Spring Lake, N. J. An all-time high registration and attendance of 500 members and guests swelled the last annual meeting at the Essex and Sussex hotel, as NAC officers and board announced that the 1958 meeting will be held at the Bon Air in Augusta, Ga., and the 1959 meeting at French Lick, Indiana.

Several notable events took place at the 1957 meeting. Members elected Jack Vernon, Niagara Chemical Div., FMC, as president for the new term, to succeed Fred Hatch, and Charles H. Sommer, Monsanto Chemical Co., as vice president. Lea S. Hitchner continues as the executive secretary.

Honored at the meeting, were Dr. W. G. Reed and Mr. K. P. Ewing, who recently retired from service with the USDA. Dr. Reed was head of USDA's Pesticide Regulation Section at the time of his retirement, and Mr. Ewing was head of USDA's Cotton Insect Research Section. Retiring NAC president Fred W. Hatch presented certificates of recognition. Although Dr. Reed was not present personally at the meeting, Justus Ward, who is succeeding him in the USDA post, received his certificate in absentia.

In his parting address, Fred W. Hatch, retiring president, reviewed the activities of NAC to serve the continuously expanding agricultural chemicals industry. He stated, "The agricultural chemical industry is going through a period of economic and technological adjustments, and to varying degrees all segments of our business are being affected. I believe it can be safely stated that during the past two years, it has been necessary both as an industry, and as individual business to revise and expand many phases of our operations. Without a strong association supported by an outstandingly capable staff, we would not have had an effective period of readjustment.

"Public relations, through a thirty five per cent increase in the association budget, have been expanded for promotional and protective activities. We must implement an infinitely heavier program to inform both rural and urban people what pesticides do for them, and that temporary inconveniences are sometimes far better than permanent losses.

"If our industry is to continue to grow and prosper, we must have a strong organization equipped to serve efficiently all our members on both national and local problems." Mr. Hatch concluded by stating "I'm confident you recognize the need and will support the effort."

NAC in 1957

HOW NAC serves the industry, and what it plans for the coming year was illustrated in the annual report by executive secretary, Lea S. Hitchner, and the NAC staff: Miss Lee Grobe, assistant treasurer; Jack Dreessen, agronomist; J. A. Noone, technical advisor, and Donald Miller, public relations head.

Commenting on the magnitude of the chemical industry, Mr. Hitchner observed that the sales volume of technical chemicals has risen from $39 million in 1939 to $250 million in 1956 . . . an increase of 640%; during this same period, the chemical industry has risen 550% and fertilizer sales 500%. It's big business any way you look at it.

Mr. Hitchner in speaking of the NAC budget, listed the following breakdown of association funds:

Public Relations	38%
Government-Industry Relations	31%
General Services	25%
Pension Fund	5%
Product Liability	1%

Outlining state legislative activities, Joseph Noone, reported that in the past year some 300 bills have been reviewed,—of these, 62 required action; 30 required intensive action. Al-

. . Sales discussions at convention of AGRICULTURAL CHEMICALS ASSOCIATION

though the Miller Amendment is not now as active an issue as it was a year ago, he said, the industry has no shortage of important matters, legislative-wise to look after. He stated that trips to thirteen states were required this past year to look after legislative matters.

Discussing the public relations department, Don Miller indicated that the major job has been that of counteracting harmful or adverse publicity. This has been done, he said, with programs directed to editors, working with editors to get articles favorable to the industry published, preparing press kits for men's and women's clubs, stimulating speeches and letters to editors and to the Congressional Record of a favorable nature.

Miss Lee Grobe called attention to the fact that the USDA gets 15 to 20 letters a month complaining about pesticides . . . that, in general, these letters are from women. She suggested a logical means of reaching women and avoiding a misunderstanding of pesticide chemicals, might be through professional women's organizations. Miss Grobe stated the association is taking steps in this direction, and that she and other members of the NAC staff have addressed women's groups, and that work is being done to contact women's clubs throughout the country.

A No Credit Department

WILLIAM H. Prigmore, assistant general manager of Eastern States Farmers' Exchange, Springfield, Mass., described the cash program policy of his company, which does an $86 million dollar business each year. Almost 80 per cent of purchases with ESFE are for feed and grain, but about 10 per cent is for fertilizer and 2.5 per cent for agricultural chemicals. The volume of agricultural chemicals sales in 1956 was about two million dollars, and 1957 sales are over those of the previous year.

Mr. Prigmore stated that farmers dealing with Eastern States pay cash for their purchases because they have been trained to do so. How do we get farmers to pay cash? . . . Mr. Prigmore answered the question by listing seven contributing factors: service; education; stressing profit concept to farmer rather than unit cost; a uniform pricing policy; no bargaining; No financing; and finally, sticking to the rules.

Mr. Prigmore's complete address appears on pages 43-44 of this issue.

Mr. and Mrs. A. Gladstone, Nopco Chemical Co.; R. Wert, Minerals & Chemicals Corp.; D. Keating, Stauffer Chemical Co.; Z. Z. Dworkin, Glenn Chemical Co.

Lea S. Hitchner, executive secretary, NAC Association; F. P. Demme and Art Bixby, Pennsalt Chemicals Corp.; D. F. Murphy, Rohm & Haas Co.

The Farm Market

"OUR growing population and purchasing power indicates a rapidly expanding demand for farm production in the foreseeable future," Dr. Vergil D. Reed, J. Walter Thompson Company economist told NAC members in his address at the annual meeting.

"The demand for farm products," he said, "is expected to rise steadily over the next 20 years." He told the farm chemical men that this would create a constantly expanding market for their industry.

Citing the Paley Report (Resources for Freedom) Dr. Reed commented that the demand for farm products will be at least 40% greater in 1975 than it was in 1950. He predicted that most of the increased production necessary to meet the demand would come from "greater productivity through further mechanization and better methods" on the farm.

"Yields per acre, as well as per man hour," the New York economist said, "will increase considerably, making it unnecessary to expand acreage under cultivation appreciably." He pointed out that the Paley Report states that an increase in productivity of around 85% between 1950 and 1975 is technically possible and economically feasible."

Turning to farm marketing specifically Dr. Reed said that "while we have heard a lot about the decline of farm income over the past few years, there has been amazing reticence about the fact that total incomes of those on farms have been and still are increasing." He pointed out that productivity has been increasing constantly with the growing use of mechanization, irrigation, pesticides and fertilizers. He said that specialization, both by crops and geographically, is increasing. He said that the farm family consumes a smaller proportion of the products it grows, and buys a larger proportion of the goods it consumes than it did only a few years ago. He commented that "farming is rapidly becoming a commercial undertaking rather than merely a way of living."

Dr. Reed showed that the average value for land and buildings per farm had increased from $2,900 in 1900 to $19,700 in 1954. Over the same period the average value per acre increased from $19.81 to $84.37,

Photos on Facing Page:

(1) Paul Truitt, National Plant Food Institute; Stuart Bear, Niagara Chemical Div., FMC; George Decker, University of Illinois; Jack Vernon, Niagara Chemical Div., FMC.

(2) Jack Miller, Atlas Powder Co.; Russell Stoddard, Fairfield Chemical Div. FMC; Horace Lee, Niagara Chemical Div., FMC.

(3) Jim Conner, Taylor Chemical Co.; W. F. Newton, Columbia-Southern Chemical Corp.; W. C. McConnell, Woolfolk Chemical Works, Ltd.; Ted Plant, Columbia-Southern Chemical Corp.; Mercer Rowe, Ashcraft-Wilkinson Co.

(4) Bruce Gleissner, Diamond Alkali Co.; Dr. and Mrs. Alfred Weed, Olin Mathieson Chemical Corp.; A. L. Galloway, Diamond Black Leaf Co.; Jim Horsey, Eastern States Chemical Corp.

(5) Mr. and Mrs. Jack Vernon, Niagara Chemical Div., FMC; George Ferguson, Geigy Agricultural Chemicals; Mr. and Mrs. G. Romig, American Chemical Paint Co.; Miss Corinne Romig.

(6) Harry Johnson, Triangle Chemical Co.; Leon Kaniecki, Tennessee Corp.; Bob Sharp, Prentiss Drug & Chemical Co.

(7) Mel Goldberg, Pesticide Advisory Service; Gene Heckathorn, United-Heckathorn; Jack Miller, Atlas Powder Co.; Ralph Dorland, **Agricultural Chemicals.**

(8) Lee Hudson, California Spray-Chemical Corp; John Kirk, Velsicol Chemical Corp.; Earl Cannon, California Spray-Chemical Corp.; Silas Besthoff, Faesy & Besthoff.

(9) John Long, Virginia Chemical Corp.; J. S. Coey, Hooker Electrochemical Co.; John Stoddard, Prentiss Drug & Chemical Co.

(10) Ken Nash, Olin Mathieson Chemical Corp.; E. D. Marvin, Jr., Hubbard Hall Chemical Co.; Robert Peacock, General Reduction Co.

Photos at Right:

(1) James Merritt and J. J. Simmons, Merck & Co.; John Kennedy, Stauffer Chemical Co.

(2) W. R. Peele, W. R. Peele Co.; John Rodda, Fairfield Chemical Div., FMC.

(3) M. N. Stephanoff, Frank Albus and Joe McKenna, Fluid Energy Processing & Equipment Co.

(4) R. R. Browning, Jr., J. M. Huber Corp.; Ward Ross, Wisconsin Alumni Research Foundation; M. M. Darley, General Chemical Div.

(5) Bill Gehweiler, R. T. Vanderbilt Co.; Art Raven, Emulsol Chemical Corp.; Stanley Peele, W. R. Peele Co.

Dr. Reed said that "100 countries account for more than half the total production of tobacco, cotton, sugar beets, vegetables for sale, sweet-corn, cabbage, tomatoes, watermelons, dry onions, fruits and nuts, Irish potatoes, sweet potatoes, peanuts, barley and sorghum. Fifty counties raise three-fourths of our flax seed and more than 90% of our rice, he told the group. "Adapting your marketing methods to such high degrees of market concentration is an easy way to greater profits," Dr. Reed said.

"Naturally," Dr. Reed emphasized, "this growing productivity means growing purchasing power. Products are both cause and result. They increase productivity and increased productivity further increases sales. These rates of growth," he concluded, "certainly reflect a dynamic and growing farm market with a constantly increasing productivity to bolster its purchasing power."

A Seed Producer's Views

ORDINARILY, I'm leading in optimism, said Roswell Garst, Garst and Thomas Hybrid Corn Co., Coon Rapids, Ia., but at the moment I'm not so optimistic about the future prosperity of the farmer, and not so sure of the present prosperity of the farmer. The population increases in the United States have been phenomenal, he agreed, saying they will probably continue to set records in the years ahead. The fact is, however, that agricultural productivity is at least 15 years ahead of population increase. Agricultural production has grown at twice the rate of population during the past ten years or so. "We can produce much more than the U.S. knows how to eat . . . and surpluses caused by this continually growing production are having a depressing effect on farm income."

Mr. Garst urged that industry realize its role is interlocked with the future of the farmer, that it should not take too light and optimistic an outlook of the farmer's position. In Iowa, said Mr. Garst, the farmer makes the narrowest margin of profit on his corn crop. It costs him almost 85 cents to produce a bushel of corn, and yet when he's trying to sell it, he can't get much more for it. "Not many farmers are going to purchase insecticides to keep the corn borer from damaging a crop with so small if any margin of profit."

In making some suggestions on how to cope with the problem, Mr. Garst indicated that producers might make some effort to help sell the farmers' products rather than their own; that we use U. S. surpluses to export to foreign markets where food supplies are at a minimum. Large areas of the world are short of protein and fats, and should form a market to absorb the excess foods in the U. S. He also recommended that more of farm acreage be planted in grass, reducing surplus yields.

Mr. Garst concluded his statement by urging industry to reconsider the farmer's position . . . that if farm prices fall, the effects will be felt immediately by industry as well.

What Influences Farmers to Buy Pesticides?

DR. Joe M. Bohlen and Dr. George M. Beal of the department of economics and sociology, Iowa State College, Ames, Iowa, closed the convention with a report on what influences farmers to adopt new practices or new products.

The report, based on research in the East and Midwest over the past ten years, applies to family-operated, smaller-type farms. A progress report of "where we are at this point in research," the presentation at the meeting studied the steps to wide acceptance of improved farm practices and machinery by farmers.

Dr. Bohlen and Dr. Beal began by pointing out that formal and informal groups to which farmers belong are among the most important factors influencing their attitude toward change.

The complicated mental process of accepting ideas was graphically described with the aid of a huge flannel board behind the speakers. The five stage process, begins with an awareness stage, in which the farmer knows vaguely about some innovation, but lacks details. The second stage is the information stage. The farmer's interest is developing and he gets facts and information.

The third step is the evaluation stage when the farmer weighs alternatives, wonders if he can do it, and makes a decision to give the new product or practice a trial, which is the fourth stage. In the trial stage the innovation is used experimentally on a small scale. The last stage is the adoption stage in which the farmer has become satisfied with the innovation and adopts it for large scale, continued use. This whole process sometimes takes as long as 15 years from the introduction of a process to its adoption by an individual farmer.

The time between introduction and adoption varies with the type of change. For instance, improved seed or fertilizer, which could be applied with the farmer's existing equipment, in most cases would be adopted sooner than new and costly equipment or materials.

Dr. Bohlen and Dr. Beal next discussed the communications sources which influence the farmer in all steps of the adoption process. Newspapers, radio, farm papers, and magazines do much to make the farmer aware of new developments, and government agencies provide the details. Neighbors and friends have been found to be influential in the evaluation stage as well as the trial stage when the farmer is making up his mind about the departure from his old way of doing things. The most important factor influencing the final adoption is the farmer's satisfaction. An important point brought out here was that representatives of commercial firms introducing new products or practices should help farmers interpret the results of their experiments and make sure that they follow the proper procedures in their trials.

In a further breakdown of the study, it was pointed out that not all people accept ideas at the same rate. The lecturers listed five categories of people who adopt practices. The first is the innovator, who usually has a large farm, comes from an established family, is highly regarded in the com-

(*Continued on Page* 107)

Hercules Shows Toxaphene Controls Boll Weevil in Louisiana

IN an effort to determine whether or not toxaphene actually can be used to economically control the boll weevil in Louisiana, the Hercules Powder Co., Wilmington, Del., conducted demonstrations on 1,750 acres in eight Louisiana counties this summer.

Agricultural Chemicals magazine was invited by Hercules to tour the state's rich cotton growing areas last month for a first-hand view of the situation and to compare the results obtained in the tests with the results obtained by neighboring farmers not using toxaphene.

The State Experiment Station had removed the chlorinated hydrocarbons from the Louisiana recommendations for boll weevil control over most of the state in 1957. This, together with studies of Hercules' own records of farms using toxaphene or toxaphene-DDT mixtures during 1955 and 1956 which showed excellent boll weevil control, inspired the tests. Furthermore, research conducted at the Red River Experiment Station in 1955 and 1956 indicated that excellent yields could be obtained with a toxaphene-DDT formulation.

Agricultural Chemicals visited three of the test farms on September 19 in the towns of Bosco, St. Joseph, and Tallulah. At Bosco, we toured the farm of W. A. Callaway who has 80 acres under the toxaphene control program. Mr. Callaway's farm is located in the center of one of the areas where boll weevils had been considered to be highly resistant to the chlorinated hydrocarbons. In 1955 he harvested less than one-half a bale of cotton per acre after dumping "everything in the book" on the fields at a cost of $40 per acre without controlling the weevils. This season, he followed the Hercules program and he estimates that he will clear about $100 per acre.

Mr. Callaway's cotton was late this spring because of the heavy rains. He used four or five early season applications of toxaphene to control thrips, overwintered weevils, plant bugs, and other insects which destroy the early squares of the cotton plant. This allowed the plants to make fast early growth which permits the cotton to fruit earlier, thus allowing earlier maturity. Early maturing cotton not only is more valuable due to quality, but also tends to escape extreme build-up of pests late in the season.

Fourteen or fifteen late season applications of toxaphene and toxaphene-DDT were started in July when the first generation weevil was emerging and starting to feed on squares. A mixture of two pounds of toxaphene to one pound of DDT was used in all of the late-season applications. Mr. Callaway's weevil-control costs per acre amounted to $21.20 this year and his fields contained some of the state's finest cotton.

At the farm of Russel Ratcliff in St. Joseph, La., we saw 70 acres being controlled with toxaphene in which the average percentage of squares punctured throughout the season was 7.8 per acre. A periodic check of Mr. Ratcliff's nearest neighbor disclosed an average percentage of 54 punctured squares per acre with one count running as high as 76 per cent. Mr. Ratcliff estimated that he will harvest two bales of cotton per acre in a season which was considered ideal for the boll weevil because of the heavy rains and hurricanes which left many fields under water.

Louisiana's geography has done much to make the state a haven for boll weevils. Cotton is grown in a V-shaped area bordered on the east by the Mississippi and on the west by the Red River. Slightly to the right of the center of the V, the Ouachita River forms a third valley parallel with the Mississippi. This provides narrow strips of land, bordered on one side by woods and on the other by rivers, for cotton growth. The woods and rivers are just what the weevils order and are what make them so hard to control. In an extremely wet season like this one, control has long been considered next to impossible.

George Yerger's cotton fields are located on a strip along the levee of the Mississippi River in Tallulah. From a toxaphene treated plot of 40 acres between the Mississippi Delta and woods, which was considered to be the worst plot in the area for weevils, Mr. Yerger expects to get almost two bales per acre this year. His total cost for control with toxaphene comes to $22.90 per acre. On another section of his farm, where the state recommended program was used, Mr. Yerger's control costs amounted to about $36 per acre and his yield on this section will not match the two bales from toxaphene treated plots. Mr. Yerger's regular control procedure included 14 applications of

(*Continued on Page* 52)

FERTILIZER PRODUCTION TECHNIQUES; NEW PESTICIDE CHEMICALS; AMONG FEATURED REPORTS AT CONVENTION OF AMERICAN CHEMICAL SOCIETY

CHEMISTS from all over the world met with the American Chemical Society when it held its annual meeting in New York City hotels the week of September 8-13. Of interest to the agricultural chemicals industry were the sectional meetings and reports of the Division of Fertilizer and Soil Chemistry and the Division of Agricultural and Food Chemistry. Reports on the pesticides: Sevin, Phostex, Nialate, were received with considerable interest by the insecticide group; while fertilizer and soil chemists and production men reviewed the use of urea formaldehyde fertilizers, ammoniation and granulation techniques, caking and grinding operations, etc. Some of the reports are reviewed in these pages, others will appear in later issues.

The Organophosphorus Pesticides, Phostex and Nialate

J. R. Willard, John F. Henahan, E. F. Orwell and Jack R. Graham, Niagara Chemical Division, FMC, Middleport, N.Y., outlined some of the properties and development of the new trade compound, Nialate, originally introduced under the designation Niagara 1240. They indicated the compound is expected to have an important place in the control of various deciduous fruit pests as well as many other agricultural crop pests.

Chemically, Nialate is bis (3-diethoxyphosphinothioyl) mercapto) methane. The technical product is a slightly colored liquid, having a mild odor similar to that characteristic of most dithiophosphates.

Against mites, the material combines the effects of very rapid initial kill, excellent ovicidal action and good residual activity to give an extended period of protection to the treated plant, being particularly effective against the 2-spotted mite complex on cotton. While not as generally active against aphids as against mites, it has demonstrated good activity against several species of aphids, notably the rosy apple aphid. On deciduous fruits, Nialate has been especially effective against codling moth, Oriental fruit, moth and apple maggot and against various scale insects, particularly the San Jose scale.

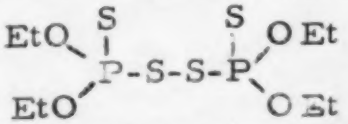
At the recommended field application rates, the new pesticide has been demonstrated to be non phytotoxic to all crops thus far tested with the possible exception of prunes and the Wealthy variety of apples.

Nialate has demonstrated little or no systemic activity. Contrary to the case of many other important thiophosphate pesticides, the greatest activity of Nialate appears to reside in the parent compound rather than its oxidized or isomerized forms.

J. R. Willard, J. F. Henahan, E. F. Orwell and J. R. Graham, of Niagara, presented the report on the new organophosphorus pesticide Phostex, originally introduced under the designation Niagara 1137. The compound is currently being developed for rather specific uses in the control of certain pests of deciduous fruits.

Phostex, they said, is best described as a mixture of bis(dialkoxy phosphinothioyl) disulfides, derived from a mixture of 3 parts ethanol and 1 part 2-propanol.

In the studies of the miticidal activity of mixtures related to Phostex, it was observed that the activity of the mixture reached a maximum when the ratio of ethanol to 2-propanol was approximately three. On this basis, it is concluded that the most active component of Phostex is



However, it has not yet been possible to synthesize this compound as a separate entity.

While Phostex has shown interesting activity against several species of mites and insects, Phostex shows its greatest promise on deciduous fruits in a dormant treatment for control of the overwintering stages of certain mites, aphids and scale insects. It is particularly effective in the control of the blister mite-bud mite complex on pears.

Phostex is characterized by a very low toxicity to mammals. Having an LD50 to white rats of 2500 mg/kg, the new pesticide is believed to be the least toxic organophosphorus pesticide now available to the industry.

Corrosion of Metals by Liquid Mixed Fertilizers

LIQUID fertilizers are becoming increasingly popular, observed J. D. Hatfield, Tennessee Valley Authority, who continued to say that although single nutrient liquids such as anhydrous ammonia and nitrogen solutions have been used for some time, the use of liquid mixtures is a relatively new field. A report by Mr. Hatfield, A. V. Slack, G. L. Crow and H. B. Shayer, TVA, Wilson Dam, Ala., reviewed the problem of corrosion of tanks and equipment due to liquid mixed fertilizers.

In selecting materials, they reported, the manufacturing plant itself has a choice between mild and stainless steel. Mild steel is in general use for all parts except the reactor vessel, which is normally built of stainless steel, since raw acid may be present in it at one stage of a neutralization process. The two construction materials have been in

use for some time, and appear to be satisfactory, except for the cost of stainless steel.

Aluminum as the material for tanks and application equipment presents something of a problem, since it is less resistant to liquid mixes and costs more. Generally, therefore, mild steel is used when mixes alone are handled. Distributors and users of nitrogen solutions, however, use aluminum equipment, because it is much more resistant to nitrogen solutions than is mild steel. Corrosion becomes a particular problem when distributors take on the venture of making or distributing liquid mixed fertilizers, and farmers start using them, and are equipped only with aluminum tanks and units.

ALUMINUM IS CORROSION RESISTANT TO NITROGEN SOLUTIONS; STEEL IS NEEDED FOR LIQUID MIXES; CORROSION BECOMES A PROBLEM WHEN ONLY ONE MATERIAL IS AVAILABLE FOR HANDLING BOTH LIQUIDS.

In a study of corrosion, the authors report as follows.

Significant increases in corrosion rate resulted from increase in phosphate content of the solution, increase in temperature, and aeration of solution. Beneficial conditions were presence of potash and use of an inhibitor. Variables such as the ratio of ammonia to phosphoric acid in the solution, acidity of the solution, use of urea versus ammonium nitrate, and welding of the aluminum had no significant effect in the ranges studied.

The tests indicated that aluminum is in a marginal category in regard to use with liquid mixed fertilizers. Under some combinations of the variables, fully acceptable resistance was found, but under others the rate was unacceptably high. Between these extremes, several combinations of conditions gave corrosion rates which may or may not be acceptable, depending on conditions which vary from plant to plant.

Of the factors which can be varied to favor use of aluminum, use of an inhibitor (sodium dichromate) was one of the most effective. Acceptable resistance was found in practically all tests in which inhibitor was used. The fact that some plants have coolers is another favorable factor, since the solution can be cooled to a generally non-corrosive level before storage or shipment. Time of exposure is an additional consideration, especially for transfer and application equipment. Such equipment may be used only a few months per year, so that if it were washed out well after use an acceptable service life might be obtained even with a relatively high corrosion rate.

Factors Affecting Liquid Phase of Granular Mixed Fertilizers

R. S. Tinsley and G. R. Gilliam, Nitrogen Division, Allied Chemical & Dye Corp., told their ACS audience that "with the increased demand for high analysis materials many changes have occurred in the manufacture of mixed fertilizers. From a simple batch mixer, where essentially dry materials are blended, the fertilizer manufacturer of today is shifting to continuous granulation equipment, where highly concentrated raw materials can be utilized. Along with the use of more concentrated raw materials," they said, "problems both in processing and in obtaining the desired product quality are encountered."

Some advantages of granulation are that it decreases the caking tendency of high-analysis fertilizers, prevents plant food segregation, facilitates more uniform distribution in the field, and decreases dust losses. On the other hand, the manufacturing process of granular mixed fertilizers becomes more complex.

In granulation, a certain degree of plasticity is required in the mixture to achieve correct agglomeration using given mechanical equipment. The plasticity will depend on the relation between solid and liquid components and the physical state of the solid components. Thus, the quality of liquid phase will be a major factor in controlling the process. Correct temperature and moisture content required for good granulation are governed to a large extent by the concentration of soluble salts present and their solubility-temperature relationship.

Due to the large number of reactions that can occur in a mixed fertilizer during processing, small changes in composition or in one of the processing variables may result in marked differences in the properties of the mixture as a shift is made from a deficiency of one material for a given reaction to an excess. Furthermore, due to changes in the price and availability of raw materials and the demand for many new higher analysis grades, the fertilizer manufacturer has to make many changes in formulation. The frequency of these changes points directly to the need for some method of predicting the effect of these changes on the processing characteristics of the mixture.

In a study of the saturated system K_2SO_4-$(NH_4)_2SO_4$-$NH_4H_2PO_4$-NH_4Cl with various amounts of ammonium nitrate it was noted that: the liquid phase of this system is increased by the addition of ammonium nitrate until the mixture be-

(*Continued on Page* 107)

SMALL CHANGES IN COMPOSITION MAY RESULT IN MARKED DIFFERENCES IN THE PROPERTIES OF A GRANULAR FERTILIZER. A MEANS OF STUDYING THIS AND OTHER VARIABLES IN THE LIQUID PHASE IS REVIEWED.

The Gibberellins - - -

*By Curt Leben and E. F. Alder**
Agricultural Research Center
Eli Lilly and Company
Greenfield, Indiana

IN August, 1956, at the annual meetings of the American Institute of Biological Sciences at the University of Connecticut, there were eight papers reporting research on the gibberellins, which attracted large and enthusiastic audiences. The gibberellins were here for the first time dealt with as a feature of an American scientific meeting. A year later, just two weeks ago, at the AIBS meetings at Stanford, there were over thirty papers on the gibberellins. In the short space of a year, a great deal had happened.

By the time of the Connecticut meetings, our researches had progressed to the extent that we were able to offer gibberellic acid for research purposes. These samples, supplemented by those of other producers, have provided the much needed chemical for investigational use this past year. The size of this endeavor is only partly exemplified by the number of papers given at Stanford. The interest of plant scientists in the gibberellins has been great, and at nearly every experiment station in this country and in many of those overseas the gibberellins are subjects of intense research efforts.

Also, during this past year, we saw in the United States commercialization of one of the gibberellins, the potassium salt of gibberellic acid. This material was marketed for the treatment of flowering and ornamental plants. A number of firms are now offering the acid for sale.

These several developments over a comparatively short period of time, as time is measured in the introduction of most agricultural chemicals, have naturally produced many questions, some of which I shall try to answer.

None of the responses of plants to gibberellic acid has been investigated fully with crop plants. Information has come from the laboratory, the greenhouse, or from small scale field tests, rather than from extensive field work. I shall deal primarily with positive values that have been noted on the basis of this experimental work to indicate potentiality. Numerous negative features have also appeared, some of which promise to be sharply limiting.

Plant Elongation. The fact that the gibberellins produce elongated plants is probably the most outstanding property of the material. The overgrowth effect was the first to be noted, in fact. By now a great many plants, both herbaceous and woody, have been found to respond to gibberellic acid by an extension of growth, primarily of the stem. There may or may not be an accompanying increase in dry weight. Elongation is likely to be most pronounced in dwarf varieties. Thus, gibberellic acid will produce a pole type growth of bush beans. A number of other examples could be cited. The overgrowth effect is usually seen within a few days or a week after the gibberellic acid has been applied.

The breaking of dormancy. It has been demonstrated by several workers that gibberellic acid is capable of breaking dormancy in potato tubers. Another example of dormancy breaking is the finding by our group that dormant peach and apple buds may be induced to resume growth by means of gibberellic acid. Treated plants leafed out, even though they had not been subjected to a period of cold, which is required for normal bud breaking. Still another example of the breaking of dormancy is with the grasses. It has been shown by several workers, including ourselves, that late fall or early spring application of gibberellic acid to dormant turf produces in several species a remarkable increase in growth at a time when little growth is expected. For example, in our tests this spring, we obtained several times as much grass from treated blue grass plots as we did from non-treated plots.

Flowering. Gibberellic acid has been demonstrated to accelerate or to retard the flowering of a number of species of plants. Annuals such as zinnias, beans, and peas have flowered days ahead of non-treated plants. Blooming, in salvia may be retarded. The most remarkable effects on flowering, however, are on biennial plants that require specific light or temperature conditions for blooming. An example is the florists' hydrangea, which may be made to flower by means of gibberellic acid without subjecting the plant to cold storage. The chemical radically affects the flowering of some varieties of light-influenced chrysanthemum plants. This year, for example, we had blossoms on treated plants on the longest day of the year, whereas flowers are normally produced in late September when the days are much shorter.

Fruiting. The earlier induction of flowering by means of gibberellic acid may also result in the production of earlier fruiting, as might be expected. For the annuals with which we have worked (peas, various beans), earliness has been increased by but a few days. On the other hand, the fruiting time of certain biennials may be shortened weeks or even months. Recent California work with several varieties of grapes has shown an enlargement in fruit size on treatment with gibberellic acid. Treated clusters produced larger individual fruits and a more desirable type of bunch. Tomatoes and cucumbers have been reported to form fruit under some conditions without the fertilization process having taken place.

Root Growth. It is now generally recognized that gibberellic acid applied to plants by various routes is likely to result in the inhibition of

*Based on an address by Mr. Leben presented at the annual meeting of the Canadian Agricultural Chemicals Association, September 15-18, Mont Tremblant, Canada.

the roots. It has been reported, for example, that gibberellic acid sprays on the aerial parts of potatoes, turnips, and carrots have resulted in lower yield of these root crops. This inhibition does not appear to hold for all species. More work is necessary to understand the inhibition, and possibly to reverse it. For the present, though, root growth inhibition appears to offer a serious limitation, since plants with poorly developed root systems are more likely to lodge and to be more subject to drought stresses.

Seed Germination. Seeds treated with gibberellic acid have been demonstrated to produce plants that emerge from the soil faster than those from non-treated seeds. The seeds of many species do not respond this way, however, even when treated with high concentrations. Usually treated seeds do not produce more plants. Sometimes they are elongated and of an undesirable type. For example, in our field tests with soy beans, plants from treated seed emerged faster, but with high concentrations of the chemical were spindly and many stems broke. After a few weeks there was no difference ascribable to the treatment, except that there were fewer plants. The acceleration of germination of some species is especially marked at low temperatures, which is a potentially useful phenonemon.

Other responses. A number of other responses of plants to gibberellic acid have been noted, including an increase in the rate of leaf expansion, and chlorosis. The yellowing of treated plants is common, and often it is easy to tell which part of a field has been treated by the color alone. Under some conditions increased fertilizer results in a normal green plant.

There is little doubt that gibberellic acid produces profound changes in the physiology of plants sensitive to the chemical. In experimental work this has been shown to be reflected by a change in enzyme content and in other features of internal chemistry. Changes in the carbohydrate metabolism appeared to be most intimately associated with the action of gibberellic acid. Some workers have reported a decrease in reducing sugars, but others have reported an increase. The influence of gibberellic acid on the carbon assimilation of the plant does not appear to be related directly to photosynthesis, since the effect of gibberellic acid may be noted in the dark.

In addition to specific types of action of gibberellic acid, I shall now mention other aspects that bear on the possible utility of the material. It has been shown, for example, that species vary greatly with respect to their response. In our tests, some of the foliage-type house plants were not affected by sprays of 1,000 ppm., whereas bean plants were sensitive at less than 1 ppm. Furthermore, different varieties of beans responded differently to a given quantity of gibberellic acid.

A second generalization is that the effects of a gibberellic acid application tend to wear off. The time this takes in some instances is dependent on the amount of gibberellic acid applied: the more applied, the longer the effect.

Definitive studies have not been made on the relative effectiveness of different sites for the application. It has been shown, however, that the material is active when it is sprayed on the aerial portions of the plant, when it is applied in a lanolin paste to specific areas, when it is injected, and when plants are grown in nutrient solutions containing the material. While seed treatments are effective, applications to soil would not appear to be suitable, since gibberellic acid has been reported to be inactivated in soil.

NONE OF THE RESPONSES OF PLANTS TO GIBBERELLIC ACID HAS BEEN INVESTIGATED FULLY ON CROPS AS YET. THE TRUE POTENTIAL OF THIS NEW AGRICULTURAL TOOL IS STILL TO BE DETERMINED.

All of the work on the gibberellins stems from a discovery of a Japanese plant pathologist named Kuro Sawa, whose findings were published in 1926. He worked with a rice disease incited by a fungus, grew the fungus in culture in his laboratory and filtered the culture to remove the fungus. Later, a group of scientists at the University of Tokyo became interested in the problem. First, from the culture filtrate they isolated in pure form the inhibitory substance, and then in 1938, announced they had obtained two crystalline substances that produced the overgrowth effect. These materials they named gibberellins A and B.

Until a few months ago, the contents of many of the early Japanese papers on the gibberellins were not known to the western world. This information is now provided in an excellent review article, which appears in the 1957 issue of the *Annual Review of Plant Physiology.*

From what is known of the structure of the gibberellins, it is clear that they bear no close resemblance to any other plant growth substance. Several gibberellins have been described; however, but two are well recognized. These are giberellin A and gibberellic acid. Both have the basic structure of a fluorene and both are lactones. With the lines of the rice fungus we use in this country and under our fermentation conditions, gibberellic acid is primarily produced. In the Lilly product, for example, gibberellin A can be detected infrequently and only in small amounts.

The production of gibberellic acid is by the fermentation methods used industrially for the production

(*Continued on Page* 104)

STUDY OF THE MECHANISM OF CAKING AND ITS PREVENTION IN SOME GRANULAR FERTILIZERS

GRANULAR fertilizers are much less subject to caking during storage than are nongranular fertilizers of the same formulation and moisture content. However, granulation is not an infallible panacea for caking problems. Research by the U. S. Department of Agriculture and others has shown that the caking of both granular and nongranular fertilizers is influenced by such factors as size and shape of particles, moisture content, length of curing period, formulation, and amount and kind of conditioning agent used.

In TVA's experimental work on production of various granular high-analysis fertilizers, tests were made to evaluate the storage properties of the products in their original condition and after they were subjected to various combinations of drying, curing, and coating with a conditioning agent. Some of the products that caked in storage and some that stored satisfactorily were studied microscopically to determine the mechanisms of caking and the mechanisms by which the various treatments prevented or reduced caking.

MECHANISM OF CAKING

Examinations of caked fertilizers showed that, in all cases, bonding between granules was the result of intergrowth of crystals of soluble salts that had formed on the surfaces of granules during storage. These crystals often covered the entire granule in the form of a veneer or hull. Compositions of the salts depended on the formulations used in making the fertilizers. Most of the products had numerous small cavities within the granules; these cavities apparently resulted from movement of solution phase to the surface of the granule while the crystals were forming. The inner surfaces of these cavities often were coated with the same crystalline phases that appeared on the surface of the granule. It appeared that there was sufficient moisture in the granules to propagate caking and that caking was not dependent on moisture absorbed from external sources. This fact was demonstrated by using bags with efficient moisture-proof barriers in the form of asphalt-laminated plies and, also, by using sealed cans as storage containers. The precaution of using moisture-resistant bags alone, therefore, will not necessarily prevent caking.

PRODUCTS STUDIED

Products made with superphosphate and ammonia—ammonium nitrate solution, included the following grades: 15-15-15; 12-12-12; 10-10-10; 10-20-20; and 8-16-16. The formulations for the other products included sulfuric acid. Potassium chloride was the source of potash. The major crystalline compounds that constituted the bonds between granules in caked samples of these products were potassium nitrate and ammonium chloride.

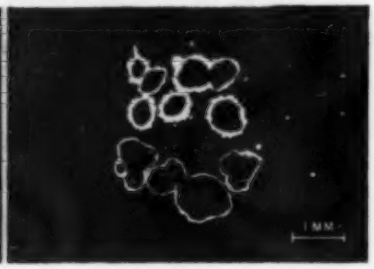
Examinations were made also of 12-12-12, and 10-20-20 and 8-16-16 fertilizers prepared with ammoniating solution, which contained ammonia, urea and ammonium carbamate, but no ammonium nitrate. These products caked severely when stored without conditioning at 3.2 to 4.7% moisture. Caking was eliminated or greatly reduced, however, when they were dried to about one per cent moisture or were conditioned with about 50 pounds of kaolin clay or kieselguhr per ton of product. Curing was not very effective in improving storage. In all cases, these products developed somewhat harder bag sets than did products of the same grade and moisture content made with ammonia-ammonium nitrate solution.

EFFECT OF MOISTURE

Examinations were made to determine the effect of the initial moisture content of granular fertilizers on the growth of the crystalline compounds responsible for caking. The products studied were the 15-15-15 and 12-12-12 grades made with superphosphates and ammonia-ammonium nitrate solution and the 12-12-12 grade made with ammonia-urea-ammonium carbamate solution. It was found that the extent of crystalline hull formation on granules was less in the products of low moisture content. The hulls were not only thinner but were denser and did not display prominent projecting crystal growths. Also, the potassium chloride particles in the granules of lower moisture content showed much less alteration.

Granules of 14-14-14 Leached-Zone Fertilizer Cleaved to Show Hulls of Potassium Nitrate and Ammonium Chloride that Developed During Storage.

Difference in Hull Thickness of Undried (Top) and Dried (Bottom) 12-12-12 Granular Fertilizer Made with Ammonia-Urea Solution.



*Based on report presented at the American Chemical Society, September 10, 1957 by Julius Silverberg, James R. Lehr, and George Hoffmeister, Jr., Tennessee Valley Authority, Wilson Dam, Alabama.

EFFECT OF CURING

Pile curing for seven days prior to bagging helped to reduce or prevent caking the granular products in subsequent storage. These products caked in the pile during the curing period, but the lumps were broken up before the cured materials were bagged. When the lumps were broken, there was considerable fracture of granules, which attested to the strength of the bonds that had formed. Microscopic comparisons of cured and uncured products were made after three and six months of storage. Usually there were little or no differences in the extent of formation of crystalline hulls on the cured and uncured products, even though there were differences in degrees of caking. When there were differences, the hulls on the cured products were more highly developed. In view of these observations, it appeared that the curing period served to accelerate the hull formation processes and allowed them to proceed to near completion. This acceleration probably was a result of the retention of heat and moisture in the pile during curing. In products that responded well to curing, there apparently was not sufficient additional development of crystals after curing to cause caking.

EFFECTS OF CONDITIONING

A group of products* tested showed improved storage properties when they were conditioned by dusting with 2.5% by weight of kaolin clay or kieselguhr in a rotary tumbler prior to bagging. Kieselguhr usually gave slightly better results than kaolin, but kaolin was satisfactory for most products and was used because of its lower price. The kaolin was in the form of a dust; 90% of the particles were smaller than 10 microns, the bulk density was 31 pounds per cubic foot, and the moisture content was less than 1%. The kieselguhr was 76% -10 microns, the bulk density was 12 pounds per cubic foot, and the moisture content was less than 4%.

Microscopic examinations of conditioned granules after bag storage showed that most of the products were coated uniformly with the conditioning agent and that the functions of the conditioner in preventing caking were about the same in all cases. The presence of the conditioner did not prevent the formation of crystalline hulls on the granules; however, in most cases, the hulls formed beneath the coating of conditioner and seldom did the crystals project beyond the layer of conditioner. The conditioner appeared to have aided in extending the crystallizing phase over the surface of the granules, thus preventing localized growth of crystals at contact points between granules. Another very obvious result of conditioning was that crystals comprising the surface hulls were much finer grained, more intergrown, and more densely packed than were those that comprised the hulls on unconditioned products. These effects are believed due to a seeding action of foreign nuclei supplied by the conditioner. A third function of the conditioner was observed to be as a separator between granules; this apparently discouraged intergrowth of crystalline hulls during and after their formation.

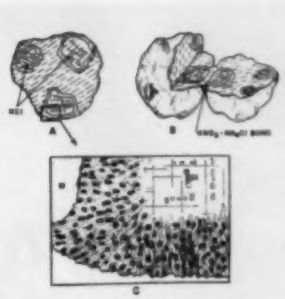


Figure 1: Observed Alterations of Potassium Chloride

A. Cross-sectioned granule showing potassium chloride grains with hulls of alteration products.
B. Cut-away sketch of granules bonded by potassium nitrate - ammonium chloride alteration products.
C. Enlarged section of A showing unaltered potassium chloride, potassium nitrate intergrown with granular ammonium chloride (X-S), main mass of granule (M). Note elongated crystal habit of potassium nitrate. Both potassium nitrate and ammonium chloride are equally prominent at bonding sites.

The crystalline hulls on conditioned products that caked in storage had developed upward into the layers of conditioner to varying degrees and, as a result, conditioner had become occluded in the hulls. In some products, relatively large proportions of the conditioner generally had been occluded in the surface hulls, and in some places no surface conditioner remained. In other cases it appeared that the unoccluded conditioner had been agglomerated into sparsely distributed lumps, probably by a flocculating action of salt solutions permeating the layer of conditioner. When these processes occurred, they contributed to the destruction of the separation function of conditioner and were responsible, to a large degree, for caking.

Unincorporated potassium chloride particles that were present in some products because of poor granulation also became well coated with conditioner. Nevertheless, these particles still showed reaction below the layer of conditioner similar to that noted in the unconditioned products. However, the coating of conditioner was not destroyed, and no caking bonds resulted. Coating with a conditioner, therefore, appeared to counteract the effects of poor incorporation of potassium chloride. It may be concluded from this observation that a conditioner does not necessarily prevent movement of reactive solutions between granules but that it does serve to modify the crystalline growths that result.

(*Continued on Page* 109)

Use of conditioners, such as kaolin or kieselguhr, aids in reducing caking in storage of fertilizers. One function of the conditioner is to act as a separator between granules, discouraging intergrowth.

*Products made with superphosphates and ammonia-ammonium nitrate solutions: 15-15-15; 12-12-12; 10-10-10; 10-20-20; 8-16-16. Products made with superphosphates and solutions containing urea: 12-12-12; 10-20-20 and 8-16-16.

Canadian Agricultural Chemicals Association

THE fifth annual convention of Chemicals Association was held Chemical Association was held at Mont Tremblant Lodge, Mont Tremblant, Quebec September 16 through 18. Member companies in the association who now number 49 elected M. E. Ward of du Pont Company of Canada, Montreal as president of the organization for the coming year, succeeding G. E. Willan, Niagara Brand Spray Company, Ltd., Burlington, Ontario, retiring president. The new first vice-president is J. H. Elliot of Rohm & Haas Company of Canada, Westhill, Ontario, with S. R. Stovell of North American Cyanamid, Toronto as second vice-president. D. D. Stokes of Monsanto, Canada, Ltd., Montreal will serve as secretary for the coming year, with G. E. Flemming of Natural Products Corporation, Montreal as treasurer.

Directors for the coming year include Mr. Willan ex officio, P. E. Redman, National Grain Company, Ltd., Winnipeg, W. M. Karn, Electric Reduction Company of Canada, Ltd. Toronto, W. H. Silverside, Interprovincial Co-operatives Ltd. Winnipeg, J. K. Brown, Sherwin-Williams Company of Canada Ltd., Montreal and J. S. Wilson, Dow Chemical of Canada Ltd., Toronto.

The board announced that the 1958 annual meeting of the association will be held in Winnipeg.

Featured on the program was a review of 1957 experimental results on the gibberellins by Dr. Curt Leben of Eli Lilly Company of Indianapolis, Ind., whose paper is presented in full elsewhere in this issue (see page 36).

Statistics on the sale of pest control products were the subject of a panel discussion by J. J. Parchelo of the Dominion Bureau of Statistics and D. K. Jackson, market research manager of Monsanto, Canada Ltd. CACA has been working with representatives of the Statistical Bureau over the past year with a view to speeding up release of the annual report at an earlier date. Mr. Parchelo indicated that the Bureau will have the 1957 crop year figures available early in January of 1958. The period covered will be September, 1956 through September 30, 1957, rather

Back row: W. M. Karn, Electric Reduction Co. of Canada, a director of CACA; G. E. Willan, Niagara Brand Spray, Ontario, past president of CACA; **front row:** P. E. Redman, National Grain Co., Winnipeg, director of CACA; J. H. Elliott, Rohm & Haas, Toronto; M. E. Ward, du Pont of Canada, president of CACA; S. R. Stovell, North American Cyanamid, Toronto; J. K. Brown, Green Cross Products, Montreal; and J. S. Wilson, Dow Chemical of Canada.

A. W. Hutchison, Shell Oil Co. of Canada; J. H. D. Ross, Chipman Chemicals Ltd.; Arthur Carter, Sherwin-Williams Co. of Canada; Mrs. Henri Vautelet, past president of Canadian Association of Consumers; G. E. Willan, past president of CACA, and M. E. Ward, duPont of Canada, president elect.

at Mont Tremblant

than the calendar year as for previous reports, resulting in a slight overlap this year. Forms will be mailed to all reporting companies by October 15. DBS has requested that the forms be filled out and returned within 30 days time. Earlier release of the report will aid members of the industry in planning their marketing programs.

It was suggested by several speakers that the Bureau consider the collection of figures on inventory carryovers for some of the industry's major products. A motion to this effect was introduced by Mr. Arthur Carter, Sherwin-Williams Company of Canada.

Comments on Soil Sterilants

DR. J. R. Hay of the Canadian Department of Agriculture discussed "Soil Sterilants," emphasizing the complexity of the subject because of the many variables encountered: plants show wide differences in their susceptibility to the various sterilant materials, with some species being quite sensitive while others are more or less tolerant; soil introduces another series of variables, with different soils varying widely in: 1. fixation, 2. leaching and 3. decomposition of the sterilant; weather and rainfall introduce still further variables.

Dr. Hay suggested that a basic knowledge of the fate and behavior of the various sterilants in representative soils is extremely important, particularly data on fixation, leaching, and decomposition. "Some fixation is necessary for a prolonged residual effect and surface sterilization, but on the other hand some leaching is necessary for the establishment of toxic concentrations at lower depths. For permanent sterilization non-selectivity, firm fixation, a minimum of leaching and decomposition are essential, but for semi-permanent sterilization moderate leaching and decomposition are necessary."

In view of the varying requirements, the speaker suggested that "we should not be looking for an ideal general purpose soil sterilant." No one chemical, he indicated, can perform effectively in the different types of jobs that various soil sterilants are called upon to do, and while a number of efficient sterilants are available, none of these is suitable for all conditions. Dr. Hay suggested that "sterilants should be recommended only for the uses and roles to which they are best suited. Companies should clearly define the limitations of their compounds and not recommend them as universal remedies. Sterilants of the future should be tailored for specific purposes."

He also expressed the opinion that under many conditions mixtures of sterilants will give better results than any single material alone and in the future mixtures will in all probability be widely employed. He questioned whether it is wise to aim at 100% kill unless absolutely necessary, suggesting that it is often more ef-

(Continued on Page 105)

A Swedish Experiment in PHOSPHATE

AN eminent Swedish scientist, G. Berngtsson, points out that in any investigation of plant nutritional problems it is very important to conduct the tests over a long succession of years, in order to fully assess the influence of the several plant nutrient elements on the harvest and on the soil fertility level. Keeping this in mind he initiated at the Melöhus County Experimental Farms a series of phosphate and potassium tests at the beginning of the 1930's, and the tests were continued up till 1952 at the Flat Meadow Farms.

The results are conveniently summarized in Table I given below:

The soil of the test plots contained a moderate amount of clay, had an unsatisfactory content of phosphorus and a fairly good level of potash; its reaction was pH 7.

Plot A. received no phosphate.

Plot B. Half the area received phosphate each year.

Plot C. All the area received phosphate each year.

Amounts: *B plots:* before 1944, 200 kg. superphosphate (normal) per hectare on the sugar beets; other crops in rotation received 100 kg. superphosphate per hectare. From 1944 on, all crops received 200 kg. superphosphate per hectare.

C plots: before 1944, sugar beets given 400 kg. superphosphate per hectare, 200 kg. super on remaining crops. From 1944 on all crops in this series received 400 kg. super per hectare.

The entire experimental area received a basal fertilization of 100 kg. of 40% potash salts per hectare annually, and nitrogen as required by the needs of the different crops.

Rotation: During 1937-50: grass-grass-wheat-sugar beets-corn-mixed legumes-corn-sugar beets-spring wheat-grass-grass-fall wheat-sugar beets-spring wheat.

Flat-Meadow Experiment

In the fall of 1949 the soil of each plot was sampled and the pH and nutritional content were determined. The results are summarized in Table 3, below:

Comparing the size of the gains, the sugar beets without exception gave the best response to the phosphate in both the 200 and the 400 kg. application. Even in 1940 and 1944 when 20 tons of stable manure were applied to the sugar beets, the phosphate plots gave the highest yield. The calculation of the gain was based only on the peak effect of the superphosphate.

The importance of phosphorus in relation to sugar content of the beet is shown in Table 2, following; in the data, we see how the sugar content increases as the applied phosphate increases.

The data in Table 3 shows that there were no significant differences in the pH, potash, boron and copper values. However, significant differences were found in the soil's content of easily soluble phosphorus. This gives us a good insight into the manner by which the phosphate condition can be changed by different methods of phosphate fertilization. The appreciably larger quantity of available manganese in the plots receiving the total amount of P_2O_5 is also noteworthy, the difference being + 1.5 mg. per kg. soil between the no-phosphate and the total-phosphate plots. This difference was statistically evaluated and found to be + 1.5 ± 0.33.★★

TABLE 1.

Yields and Profitableness of Phosphate Fertilization. 1937-1950

	A	B	C
	Without P	½ Rate of P	Full Rate of P
Total yield (food units equivalent)	50,005	61,194	65,345
Total yield, relative index	100	122	131
Increase due to P (food units, equiv.)	.....	+11,189	+15,340
Value of yield increase (0.30 kr. per food unit)	.....	3,357:—	4,602:—
Total superphosphate applied, kg. p. hectare	.....	2,200	4,400
Cost of super, kr.	.....	330:—	660:—
Total gain, 14 year period, kr.p.ha.	.....	+3,027:—	+3,942:—

kr. = Swedish kronen; P= phosphate.

TABLE 2.

Sugar content as percent of fresh weight

	Sugar content in % fresh weight		
	a.	b.	c.
Cultivation Year	Without Phosphate	½ of total Phosphate	Total am't Phosphate
1940	18.7	19.6	19.5
1944	15.2	17.6	18.6
1949	18.4	19.8	19.4
Average	17.4	19.0	19.2

TABLE 3.

Average soil analysis results. Fall of 1949

	Flat Meadow Experiment					
a.	pH	Phosphate Value	K_2O Value	Manganese Value *	Boron Value **	Copper kg/hectare
Without Phosphate	6.70	85	285	2.1	0.9	26
½ total P_2O_5 applied	6.76	130	285	2.0	1.0	25
Total P_2O_5 Applied	6.75	295	270	3.5	0.8	25

* Test according to Stenbjerg, mg/kg soil.
* Truog method, mg/kgsoil.

Sales—$86 MILLION and No Credit

By W. H. Prizmore
Eastern States Farmers Exchange

EASTERN States is a Farmers' Purchasing Cooperative which was founded in 1918 to help the farmers of New England obtain quality production supplies at a fair price, through their own organization. It struggled and nearly collapsed on several occasions, but 38 years later farmers in the six New England States, Pennsylvania, (with the exception of the northern tier of counties), Delaware, and the Eastern Shore, and northern sections of Maryland, still own the facilities indicated.

The principal ones are two feed mills at Buffalo, New York, and Huron, Ohio—and four fertilizer plants at Cambridge, Massachusetts, Wilmington, Delaware, York and Kittanning, Pennsylvania.

Two agricultural chemicals and farm supply plants at West Concord, Massachusetts, and York, Pennsylvania—two research farms, one for feed at Ellington, Connecticut; and for seed at Feeding Hills, Massachusetts.

One central office at West Springfield, Massachusetts and one Middle Atlantic distribution office at York, Pennsylvania.

The total depreciated value of these facilities is $22,700,000.

Eastern States is a manufacturer in some fields, a converter in others, and a distributor for many organizations. In the agricultural chemicals field, Eastern States function as dust blenders, liquid formulators, and distributors.

All commodities distributed by Eastern States move to the consumer through a true dealer structure. The dealer is never bypassed, and thus, there are no house accounts.

The dealer structure also consists of 400 local representatives of Eastern States. Some operate stores, and others depend upon farm storage and the Eastern States service stores.

The service store is typical of the smaller type currently being constructed where feed grinding and mixing facilities are not required.

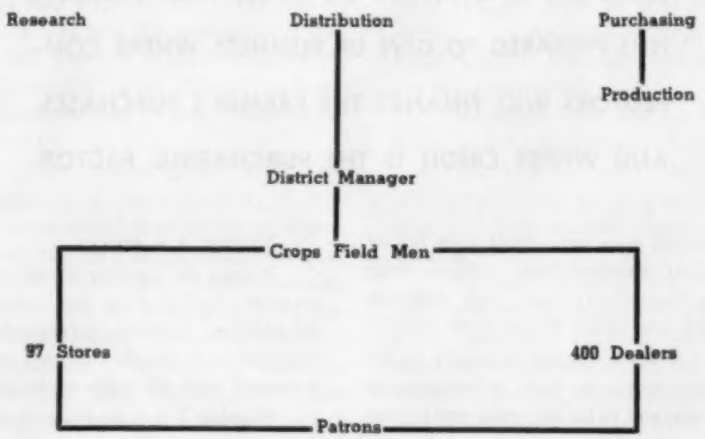
Each of the five Commodity Services is divided into three main sections consisting of Research, Distribution, and Purchasing which includes Production.

The diagram below illustrates the sales organization of the Agriculturals Chemicals Service. The area served is divided into 22 districts, each headed by a district manager.

Fertilizer, Seed, and Agricultural Chemicals work through 22 crops fieldmen who specialize in these services. They, in turn, work with the personnel of the 97 stores and 400 dealers who serve the 224,000 patrons.

Great emphasis is placed on the educational program. It is intended to help patrons become better farmers and sticks to that target. Many meetings are held with staff and patrons alike. The best teaching techniques especially adapted for our use are followed. Extensive use is made also of slides and motion pictures.

Have farmers supported this type of approach to meeting their purchasing problems?

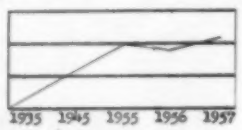


*Presented at the National Agricultural Chemicals Association meeting, September 4-6, Spring Lake, N. J.

In 1956, they spent 86 million in cash with their organization.

	Amount	Per cent
Feed and Grain	$66,528,046.89	77.9
Seed (Field Vegetable and Potatoes)	3,954,637.36	4.6
Fertilizer and Lime	8,351,709.00	9.8
Ag. Chemicals	2,059,820.63	2.4
Farm Supply	4,480,878.51	5.3
	$85,375,092.39	100.0%

The specific growth of the Agricultural Chemicals Service will be of interest to this group and the growth curve is shown here. It should be noted that Eastern States started in 1918, but pesticides were first handled in 1935—with five items on the list which has now expanded to 100. In 1956, the total $ volume was slightly over $2,000,000, and 1957 has already exceeded this figure. Farmers in this area will pay cash for pesticides.



A No Credit Program

THE cash program is not new with Eastern States. It has been a basic policy since the beginning. In 1918, we had neither assets nor credit. The early financing was obtained in part by having farmers sign notes, covering their advance orders, and these notes were discounted at the banks.

All of our dealers continue to be shipped on a sight draft with bill of lading attached basis. Commodities supplied on any basis, other than carload, are added to the next draft.

As it became necessary to develop stores to meet in-between-car needs, and to handle other production supplies, the first deviation from "cash on the barrel head" became necessary. More and more deliveries were made by our own trucks; to be practical a seven day payment privilege was established. However, a 2 per cent penalty is assessed for failure to pay within the seven days, and no further materials are supplied if the account is overdue.

Historically, a cash patronage has been returned each year. Last year it amounted to 2¼ million dollars. Refund checks are withheld on patrons whose accounts are delinquent.

The figures below show the collection and accounts receivable position at the close of 1956 business. Here is the proof. Accounts receivable are shown as $1,173,000, but of this amount, as shown on the next line, $895,000 was represented by cars in transit. Accounts over 30 days totaled $24,000, and $924 was written off as uncollectible. However, against the 924 dollar loss, we had accumulated $11,000 in 2 per cent penalties for late payment, which amount comfortably covered the $924 loss.

Volume	$86,000,000
Accounts Receivable	1,173,000
Cars in Transit	895,000
Over 30 days	24,000
Uncollectible	924
2% Penalty	11,000

In conclusion—This is the question we were asked to answer by your Program Committee: "How do we get the farmer to pay cash?" In the next seven points we state our answer.

EASTERN STATES INSISTS ON ITS NO CREDIT POLICY! IT IS PREPARED TO GIVE UP BUSINESS WHERE COMPETITORS WILL FINANCE THE FARMER'S PURCHASES, AND WHERE CREDIT IS THE PURCHASING FACTOR.

Number 1 is SERVICE.

It must be superior to the competition. Included in this category are adequate facilities, substantial inventories well placed, and high grade personnel with adequate training.

Number 2 is a program of EDUCATION based on a genuine interest in the farmer and his successful use of the products offered. We approach this goal along the following lines—meetings, farm contacts, publications, movies, and slides.

Next is what we call the VALUE-IN-USE concept. You must prove to the farmer that his return will be greater by using your service. Stress profit to the farmer, rather than unit price of the commodity.

Point Number 4 is UNIFORM PRICING.

This is another basic policy with Eastern States. Every effort is made to be competitive, but our published price is the price, and every purchaser, in each specific use bracket, is treated alike. Farmers like this principle. There are no inside deals, no crop dating, no consignments, and no bargaining. The farmer should spend his time farming and trust his supplier.

FINANCING is not the business of the supplier. We are not in the banking or loan business. We urge the farmer to obtain his credit through agencies established for this purpose.

You must have STAMINA. Volume cannot be the only goal or yardstick. We have, at times, lost substantial volume to maintain our policy. In the past five years, we have lost 40,426 tons of broiler feed business in Delaware because we have refused to participate in broiler financing. This is the ultimate in credit. The chickens which the feed manufacturer owns, become the captive market, which consume his product. The Ag Chemicals business could drift down this road by owning the farmers' crops.

The seventh and final part of our answer is CONVICTION. You must be convinced that a cash program is sound for the farmer and sound for your organization. You must believe in the principle that the farmer should continue to be an independent businessman operating on a proud and sound basis. Volume may suffer, but your financial position can be strong and the added satisfaction of having helped someone help himself is real.★★

THE MILWAUKEE JOURNAL

Reviewing . . . . "Our War on Bugs"

A series of articles on pest control spray projects and public reaction are summarized in this report.

THE Milwaukee Journal in July printed a series of articles written by R. G. Lynch of the Journal staff dealing with large-scale spray programs against insects and discussing their effect on birds, fish, and humans.

Titled "Our War on Bugs," the series was an objective report on chemical insecticides and appeared at a time when public unrest over spray programs in Wisconsin and other sections of the country was being fostered by inadequate knowledge of chemical control procedures.

The opening article gave some of the history of chemical insecticides and presented informed opinions of wild life and public health officials who agree with agriculturalists that chemical controls are indispensable. The article quoted Dr. Clarence Cottam, former wild life research chief and assistant director of the fish and wildlife service, who said, "Chemicals used in controlling pests and man belong in the category of mixed blessings. They clearly manifest potentialities for great good as well as harm, depending upon our skill and wisdom in using them. Pesticides are here to stay, even though more effective, economically successful, and, it is hoped, more selective control agents replace or supplement those now in use."

As an example of how spray jobs are controlled, this summer's jackpine budworm program in northern Wisconsin was cited. In that job spray nozzles were calibrated, checked with blotting paper laid on the ground and then readjusted to get a distribution of one gallon (one pound of DDT) to the acre. Pilots were shown waters to be avoided and observers flew over the spray ships to make sure that instructions were obeyed and blotting paper tests were made of the actual spraying.

While there are outcries against spraying by the more fanatical conservationists, the Journal said, the demand among informed officials and wild life groups is for more research.

Mr. Lynch wrote that demands to halt all spraying "until we know more about it" are asking the impossible. He termed chemical controls indispensable to food production and cited agriculture department estimates of insect damage at four billion dollars a year. The forest service estimates the toll of saw timber, in mortality and growth, at 13.5 billions of board feed, plus tremendous damage to smaller growing stock. What would happen without chemical controls is awesome to imagine. The articles point out that exotic pests are continually appearing. The gypsy moth took 85 years to become a national problem, but the alfalfa aphid has spread from coast to coast in four years.

Paul F. Springer, a biologist of the fish and wildlife service, was quoted from an article in Audubon magazine in which he told bird lovers: "It is well to recall that were it not for insecticides the production of food and fiber and the protection of ourselves and our animals would be immeasurably more difficult and our standards of living considerably lower."

The Journal explained that most instances of heavy mortality of birds have occurred on relatively small areas and are considered insignificant by wildlife managers. Birds repopulate such areas by filtering in from surrounding land. Sometimes a reduced population is not due to mortality. The birds move out. When a Georgia pecan grove was sprayed, 4.36 pounds DDT to the acre, to kill weevils, the bird population showed a marked decline but no dead birds were found.

Mr. Springer says that conservation groups are justified in being concerned about hazards to wildlife and have a right to insist, except in an emergency, upon balanced programs using the safest materials and methods consistent with reasonable control. But he adds:

"Often, though, they do not know what facts to obtain about an insect control program or how to evaluate them. Sometimes, too, there is a tendency to condemn all insecticides without considering the good resulting from their use, or because of isolated cases of damage which may have been due to carelessness in what might have been an otherwise safe program."

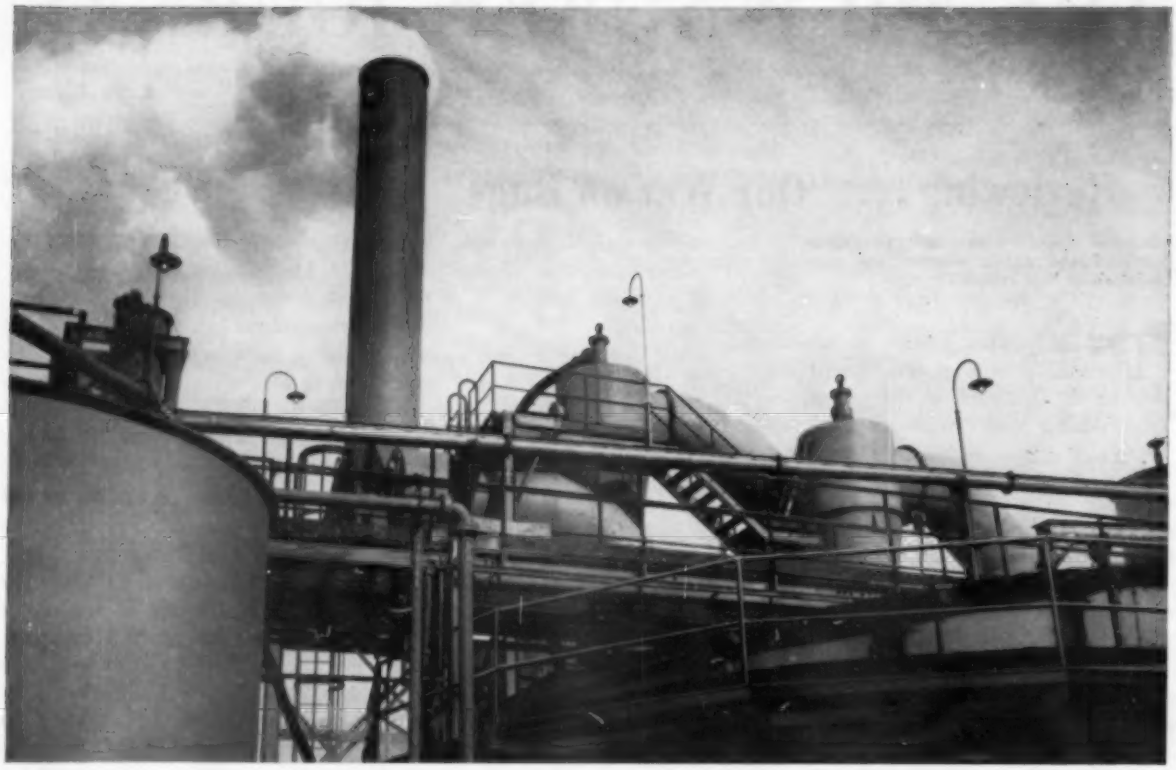
The Journal's series included a section devoted to statements by scientists of the Wisconsin agricultural and conservation departments and the University of Wisconsin who saw no cause for concern over spraying to control diseases of plants as long as the pesticides are used within the limits that are recommended.

E. L. Chambers, a state entomologist of Madison, Wisc., told the Journal, "You shouldn't believe all this stuff about the heavy kill of birds by DDT. Fourteen people see a dead robin and it becomes 14 dead robins. There's been spraying, so they were killed by DDT. Some were, no doubt, but it's exaggerated.

"Sometimes there are too many robins and it's the survival of the fittest. The cats get some. In areas where they've been spraying for years, they still have robins. Detroit, for instance."

The chief of game research in the conservation department, Cyril Kabat, said that autopsies on birds killed in Oconomowoc and the Milwaukee area pointed to a Dutch elm

(*Continued on Page* 109)



PHOSPHATIC ACID SOLUTION FROM NEW PLANT CUTS COST OF MAKING FERTILIZERS

Many fertilizer manufacturers can now cut their costs by formulating with Phosphatic Fertilizer Solution (wet-process phosphoric acid). Use of this chemical from U.S.I.'s new plant will, in many cases, enable you to produce standard or special granular formulas at lower cost. It will also allow you to make higher analysis grades of fertilizer. To help you determine if and how you can profit by using phosphoric, the U.S.I. Technical Service Engineers are ready to work with you.

And you can be assured of a steady supply of this basic fertilizer material . . . because the entire production of Phosphatic Fertilizer Solution at the new U.S.I. plant at Tuscola, Illinois, is available for non-captive commercial uses. This amounts to 30,000 tons of P_2O_5 per year.

You can, in fact, get *all* of the following fertilizer basics in addition to PFS on *short notice locally* from U.S.I. Anhydrous and Aqua Ammonia . . . Ammonium Nitrate . . . Nitrogen Solutions . . . Sulfuric Acid . . . and Nitric Acid.

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May we suggest that you get in touch with your U.S.I. man. Let him work out optimum formulations with you. He's experienced in determining the factors that make up formula cost. He will also be glad to assist you during your trial runs.

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Fertilizer Views and News

"The Whole World Kin"

AT a recent meeting of The Fertilizer Society in London the discussion centered on the use of fertilizers in the Far East. Mr. H. J. Page, a member with many years experience in that part of the world, commenting on references to the successful use of tens of thousands of simple demonstrations in India carried out on cultivators' fields, is quoted as follows:

He had had the privilege last year of visiting Bihar in India with Dr. H. U. Mukerjee, who had played a leading part in the development of this method of getting away from what the peasant was apt to regard as rather highfaluting and complex experiments on Government experimental stations, and carrying fertlizer experimentation and demonstrations on to cultivators' own fields. There was no question that it was the only way in which, in the long run, the agricultural population of a country consisting mainly of small peasants (with an acre or so each, if that) could be expected to be made "fertilizer conscious." They invariably treated the results obtained on Government experimental stations with suspicion and, even if they accepted such results, they naturally believed that the station had all the necessary resources at its disposal and could therefore afford to carry out experiments to an extent which they themselves could never do. How very familiar are these observations to extension workers and fertilizer field men in our own country.

Dr. Page continued:

What struck him forcibly with these experiments when he had an opportunity of talking to the peasant cultivators and meeting the field assistants who were responsible for these tens of thousands of simple trials was the fact that they were carried out free of charge. All the cultivator had to do was to supply the land and undertake the cultivations. The first year, they were all very reticent, but in the second and third years when they had seen the results achieved, they were clamoring to have trials on their land. Very often they went so far as to accuse the local field assistant of favoritism because they thought he allowed his friends to have experiments on their land, and did not grant the same facility to others. In addition, certain cultivators offered to pay for having trials on their land if they could only have them!

As a result of these trials the demand for fertilizers in India has already begun to show increases and it is expected that such increases will become phenomenal in the next few years.

Here indeed is food for thought for field workers in all countries, ours included. At every state fertilizer conference the question invariably is asked, how can one reach those farmers who do not attend meetings, don't read the station bulletins and make little if any effort to learn about the advantages of fertilizer usage? India's answer is to go to that farmer and somehow induce him to make a trial on one of his own fields for free. "If the mountain won't come to Mohammed, Mohammed goes to the mountain."

The proposed plan of the National Plant Food Institute to set up a large series of fertilizer demonstrations in every agricultural state under the supervision of vocational agricultural teachers, and with the cooperation of the local fertilizer industry, seems to have good sense and sound experience behind it.

•

Regarding Chelates

IN answer to a request to discuss "chelates" in simple language the following is offered with some misgivings: it is not always satisfactory to transcribe highly technical concepts to simple terms and there is always the danger of oversimplification.

What is chelation? A good picture is more revealing than words. Think of an eagle's claw grasping an object and you have the basic concept. Chelate is derived from the Greek word Kelos meaning "claw". A "chelate" (pronounced Kee-late) therefore is a "chemical claw" which holds in its grasp a chemical metallic ion, and prevents its reacting in a solution with other ions. Try to picture a solution which contains free ions of iron or copper. A chelating agent is introduced in the solution. It grasps the iron or copper and prevents it from combining with other chemical elements. For example, if the solution were to be used in soap making, the presence of copper ions would cause the soap to darken and thus stain during storage. By chelating the copper, such an undesirable reaction is prevented. The action is reversible: the chelating agent can be such that it will release the metal at a predetermined rate. A good example is red corpuscles of the blood which hold iron in a truly chelated manner.

In soil fertility problems, chelating agents which dissolve in water have been used successfully to provide trace elements to growing crops which otherwise could not be sup-

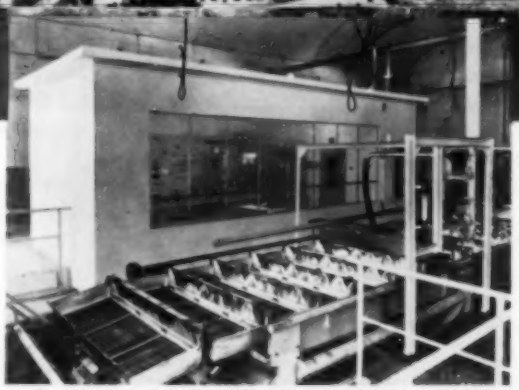
New Phosphoric Acid Plant for Norway

Dorr-Oliver Designed-Engineered-Equipped Plant
Attains Operating Capacity of 60 TPD of P_2O_5 in Two Weeks

The Norske Zinkkompani A/S Superphosphate Factory at Eitrheim near Odda, Norway.

Europe's newest phosphoric acid producer, the Norske Zinkkompani A/S, of Odda, Norway, recently went on stream producing 60 TPD of P_2O_5. One of the largest in the European fertilizer field, this new fully automatic plant attained operating capacity in two weeks, and is operated by only three operators per shift. The plant was designed by D-O's Consulting Engineering Dept., Stamford, Conn.; and by taking advantage of favorable world-wide prices, the necessary plant equipment was supplied from D-O Associate Companies in London, Milan and Amsterdam.

Dorr-Oliver's Consulting Engineering Department, with 40 years' experience in the field of concentrated fertilizer production via the wet process of manufacturing phosphoric acid, is staffed by engineers qualified to handle all phases of fertilizer plant design — from economic analysis to supervision of initial operation.



Close-up view of the Dorr-Oliver Traveling Pan Filter with the D-O designed graphic control panel in the background.

If you're considering entering the fast growing fertilizer field — or if you plan to expand present plant facilities — it will pay you to check with Dorr-Oliver. Write for Bulletin #8000, or better still, let us send an engineer to discuss your problem from the standpoint of economics and process. No obligation, of course.

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plied. For instance, in central and western Minnesota and in Florida, excess calcium in the soil ties up the iron normally present and renders it unavailable to plant life. The iron deficiency is revealed through a yellowing of the leaves, described technically as "chlorosis." The application of a suitable iron chelate, either to the soil or sprayed on the foliage of the crop corrects the deficiency. Since the soil is of a high-lime type, ordinary soluble iron compounds would not do the job because the ionic iron released in the soil solution would be tied up by the lime. But the chelated iron releases its iron at a predetermined rate and furnishes the crop with its required amount without interference by the lime. The research in Florida with iron chlorotic citrus trees provided one of the first spectacular applications of chelated iron. The yield of affected trees was increased from zero to as much as 12 boxes of fruit per tree. In Brazil, moderate spray applications of various metal chelates by correcting chlorosis increased yields in young coffee by as much as 240%: applications of sprays of iron sulfate were not successful.

In Portugal, recent research with chelates is concerned with phosphorus fixation by soil agencies. Chelates were used to counteract the forces in the soil which tend to prevent the uptake of phosphatic ions. Numerous soil scientists have observed that certain organic substances in the soil are capable of counteracting the fixation process: citric, oxalic, tartaric and other organic acids are able to do this. The Portuguese research identifies these organic materials as chelating agencies capable of reacting with aluminum and iron phosphates so as to release and keep the phosphate free and available to the crop.

This study of the role of chelation in counteracting the fixation of phosphate by iron and aluminum is of great importance to the phosphate industry and agriculture. If chelation can increase the efficiency of applied phosphate fertilizers on acid soils of known high fixing powers, a great economic gain is achieved. It may also be possible to increase the efficiency of trace elements through the formation of certain organic complexes working in combination with chelating agents. This new development should inspire industry leaders and experiment station workers to explore the possibilities. Research designed to learn more about the practical feasibility of producing lower-priced "chelators" which could be added to superphosphates or mixed fertilizers seems to be warranted.

Specifications on Fertilizer Materials

"MURIATE of potash, 80% K_2O, minus 20 mesh;" sulfate of ammonia, 21% N, minus 14 mesh; superphosphate, 20% P_2O_5, minus 20 mesh; etc., etc.

Is this how the fertilizer purchasing department will be ordering its fertilizer materials from now on? So it seems.

One of the by-products of the chemical control research sponsored by the Florida Agricultural Research Institute was this new concept of the importance in formulations whether the processing is granulation or just dry-mixing.

Already trade journals are carrying advertisements which tell about granular potash specially sized for the manufacture of modern fertilizers. One large producer has announced new installations designed specifically to enable it to size its entire production of muriate of potash.

This development is to be welcomed as one tending to increase efficiency in the fertilizer plant. Perhaps the lead thus given by the potash industry may be followed by suppliers of the other important raw materials. This is much to be desired. Good evidence exists to support the claim that particle size of raw materials used in the granulation process influences the quality and uniformity of the finished product. The potash crystals serve as nuclei around which the other materials agglomerate to form the finished granule. By using the right mesh size of the raw materials as determined by experiments, the operating personnel can reduce fines and increase the total percentage and quality of desirable finished granules.

Standardization of the range in granule size of a product labelled "granulated" or "pelletized" is being advocated by many in the industry and among control officials. This is something that needs very careful consideration and study before any action is taken. That it will come in due time is the hope of industry leaders.

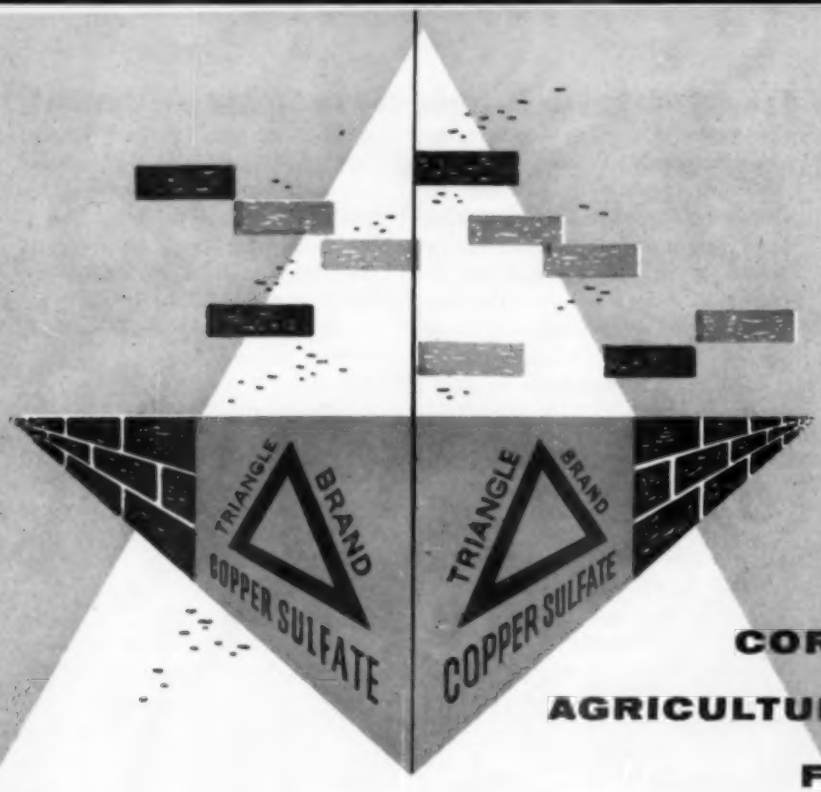
Evaporation Losses Reduced

CAN you imagine how small is one-molecule thick? The scientists tell us it is just one-millionth of an inch. Magnitudes so infinitely small like magnitudes infinitely large, say 200 billions, are most difficult to conceive. Perhaps it will help if you can think of the thickness of a soap bubble as monomolecular. Well, farmers and others with ponds subject to rapid evaporation were given heart recently by the announcement that a material long used in the cosmetic trade with the funny name, *hexadecanol*, can be used as a water surface film to slash evaporation losses by as much as 35 to 50 per cent. The molecules of this substance have the strange property of absorbing water at one end and repelling it at the other. Thus, when spread over the surface of water as a monomolecular film it perfectly shuts off the escape of water vapor but permits the through passage of sunlight and air.

According to official estimates of evaporation losses it is possible for a lake in the Southwest, for example, to lose as much as 54 inches or about 4½ feet of water in a 12-month period. Other studies made on farm ponds in Oklahoma report that a one-acre pond lost 32½ inches of water by evaporation in a 3-month summer period. These may be taken as typical of losses caused by evaporation in many parts of the country, and emphasize the seriousness of the problem to communities whether reservoirs or farm ponds or lakes are concerned.

Joint research on evaporation losses by federal and state agencies was concentrated in Oklahoma last year. Using two adjoining lakes they tested the merits of hexadecanol film

(*Continued on Page* 111)



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In sprays, where Bordeaux Mixture is the most reliable, or in copper dust, Triangle Brand Copper Sulfate has consistently proven its superiority over organic materials and it is compatible with virtually every other pesticidal material. In fertilizers, it is important for enrichment of the soil and its use assures larger, healthier and more profitable crops.

forms available are:

INSTANT (powder) for quick and efficient mixing of Bordeaux sprays.

DIAMOND small or large crystals, all containing 25.2% metallic copper.

BASIC Copper Sulfate in powder form, containing 53% metallic copper.

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Use of Dow ET-57 for the Systemic Control of Dermatobia Hominis in Cattle

By O. H. Graham†, L. L. Wade*, R. W. Colby*, W. S. McGregor*

THE larvae of *Dermatobia hominis* (L., Jr.) commonly known as torsalo, berne, and nuche in various parts of Central and South America, infest a large variety of animals, including man. These bots are of great economic importance to the Latin American cattle industry because of their tremenous numbers and their effects on hides, weight gains, and milk production. Laake (1953) has stated: "In all areas where it has become well established, it is the worst insect enemy of cattle in the world." Hambleton (1952), in discussing the combined effects of torsalo and cattle ticks, has said that the mortality in calves may be as high as 70 percent in some of the more heavily infested areas of Central America. Neel (1955) quotes Pinheiro and Baroni as finding that the instigation of control measures for torsalo made feasible the use of land in Brazil that could not otherwise be used for cattle pasture.

McGregor and Bushland (1957), have reported on the systemic control of the larval stages of the cattle grubs, *Hypoderma lineatum* (De Vill.) and *H. bovis* (L.), with the organic phosphorous insecticide Dow ET-57. Their success and the similarity in the larval development of *Hypoderma* and *Dermatobia* made it natural to attempt the control of the torsalo with this systemic.

This report summarizes the results of two tests conducted against torsalo in Panama in July and October of 1956. All arrangements were made by Dr. W. R. Mullison of Dow Chemical Inter-American, Ltd. Col. D. H. Mallan*, manager of the Motta Brothers Ranch at Remedios, being keenly aware of the importance of the torsalo to the livestock industry, made the cattle and facilities of the ranch available for these tests. The La Estrella Sugar Company near Aguadulce offered the use of non-lactating Holstein cattle from their dairy herd. Although torsalo-control programs using external applications of BHC were in effect at both places, it was possible to obtain cattle that had not been treated for 90 days and that had a moderate infestation of torsalo. Larvae in all stages of development were present, and they were generally distributed over all parts of the body. Most of the cattle had a number of cysts which did not contain living larvae, therefore, prior to the first test each animal was examined to determine the location and number of living larvae present. In the second test, the efficacy of treatment was determined by extracting all bots after three days and calculating the percentage that had been killed. Those bots that had been killed were badly decomposed by the third day and most of them were partially expelled from the cysts.

Brahma type calves and yearlings were used at Remedios. A standard 12-ounce drench gun was used to administer a 25-per cent wettable powder diluted with sufficient water so that 1½ ounces of the drench would treat 100 pounds of body weight at the desired dose. Individual weights were obtained by using scales or an average of three men's estimates. No evidence of toxicity was noted in any treated animals.

The results, given in Table 1, indicate that, although Dow ET-57 is an active systemic agent for killing the larvae of *Dermatobia hominis*, it is not so effective against this pest as it is against the *Hypoderma* larvae. At 100 mg/kg, the effective dose against *Hypoderma*, the average kill was 72.6 percent in 25 head of cattle harboring a total of 521 bots. At 150

(Continued on Page 109)

TABLE 1
Oral Administration of Dow ET-57 to Cattle For The Control of Larvae of Dermatobia Hominis, 1956

Dosage mg/kg	Date	Location	Number of Animals	Total Number of Bots After 3 Days		Percent Kill
				Alive	Dead	
50 to 67	Oct. 15	Remedios	7	36	46	56.1
75 to 94	do	do	9	58	117	66.9
100	Oct. 15	do	7	53	20	
	Oct. 19	do	10	14	49	
	July 10	do	7	61	300	
	July 11*	Aguadulce	1	15	9	
Total				143	378	72.6
150	July 11	Aguadulce	2	4	26	
	Oct. 15	Remedios	2	0	23	
	10	do	10	17	42	
Total				21	91	81.3

*Checked 6 days post-treatment

†This work was performed while the senior author was on leave from employment as entomologist, Headquarters United States Army Carribean, Fort Amador, Canal Zone. Presently employed at the Kerrville, Texas laboratory of the Entomology Research Division, Agr. Res. Serv., U.S.D.A.

*Agricultural Chemical Research, Dow Chemical Company, Texas Division, Freeport, Texas.

*U. S. Army, Retired.

FARMERS IN HERCULES' TEST PROGRAM CONTROL BOLL WEEVILS, INCREASE COTTON YIELD AT COSTS LOWER THAN IN NON-TOXAPHENE TREATED ACREAGE

(*Continued from Page 33*)

methyl parathion and three applications of arsenic insecticides. He used no early control.

An example of just how bad 1957 was as a boll weevil year was seen at the USDA's Cotton Insect Research Station in Tallulah. A check plot here, on which no insecticide at all was used, was absolutely bare of cotton. The cotton plants looked healthy and grew tall and straight, but there were no bolls. The Tallulah station is the oldest USDA entomology station in the country in point of service. It was started in 1907.

Considerable time and effort was put into the selection of the fields involved in the Hercules program. After a survey of Louisiana, fields were chosed in each of the state's localities where boll weevil problems were especially significant. All of the fields have a historical record of severe boll weevil infestation.

Farmers selected possessed suitable equipment and expressed a willingness to make applications according to the company's suggestions. Hercules supplied the toxaphene to the farmers who made the applications themselves.

The over-all problem indicated a need for an early season control program. This type program not only reduced overwintering weevils, but also controlled fleahoppers, thrips, plant bugs, and other insects which, along with the boll weevil, destroy the early squares of the cotton plant.

The program began as soon as the cotton came up to a stand, with two applications of approximately a pint of toxaphene per acre at seven-day intervals to control thrips. Following these two applications, four applications of toxaphene of one quart per acre, at seven-day intervals, were made to control overwintering weevils, fleahoppers, plant bugs, and other insects.

These latter applications were timed to start at about the time the cotton was in the six to eight-leaf stage, or when the plants started setting tiny squares. They continued up to the date that emergence records showed that 95% of the overwintering weevils had emerged. On some of the farms, a final early-season application of a 2-1 mixture was used to take care of the spring brood of bollworms, which frequently attack cotton in Louisiana.

Good control of all these pests was indicated from the excellent early crop that was set in all locations. Fields which adjoined or were in the same locality, but which were not treated, failed to set, or only partly set, an early crop.

Late-season control for the boll weevil was started at most locations in the early part of July. The timing of these applications was based on a rising infestation. Generally speaking, these applications were started on or before the time that ten per cent of the squares were punctured. A mixture of toxaphene-DDT, two pounds of toxaphene to one pound of DDT, was used in all of the late-season applications. This formulation was used because in Louisiana it has given excellent boll weevil control and superior bollworm control. For one reason or another, farmers frequently control one of these pests and let the other one cause damage.

At some of the locations where aphids developed, an application of methyl parathion was used to control this pest. This particular chemical was used because it is a good aphicide and is not generally considered to be effective against the boll weevil. Hercules wanted to make sure they were evaluating the effectiveness of only toxaphene and the toxaphene-DDT formulation against the boll weevil.

The 2-1 formulation in late season, applied at four to five day intervals, gave excellent boll weevil and bollworm control as indicated by the infestation records. The records show the average percentage of squares punctured on all the test plots during the season was 6.5 and the highest average never went above 12.1. It is generally considered by entomologists that a good cotton crop can be produced if the average of squares punctured can be kept below 40 per cent.

Without execption, all of the fields involved in the Hercules program matured faster than others in the same communities.

The boll weevil was first reported to be resistant to the chlorinated hydrocarbon insecticides in 1955. The Louisiana Experiment Station at Baton Rouge observed that boll weevils became difficult to control during the late summer of 1954, but that was attributed by many experts in control measures to adverse climatic conditions, including high temperatures, high wind velocities, and low humidities. In 1955, however, poor control was obtained under entirely different climatic conditions. This, together with laboratory findings, led to the reports of resistance.

The resistant areas were defined as: Northeast Louisiana to include Waterproof, St. Joseph, Tallulah and large areas of East Carroll Parish; the Ouachita River Valley south of Monroe; and the Red River Valley, including parts of Caddo, Red River, Bossier, Grant, Natchitoches, and Rapides Parishes.

The Hercules test farms were located throughout these areas and the excellent control results obtained, under varied weather conditions, indicate that the boll weevil can be economically controlled with toxaphene and toxaphene-DDT mixtures.★★

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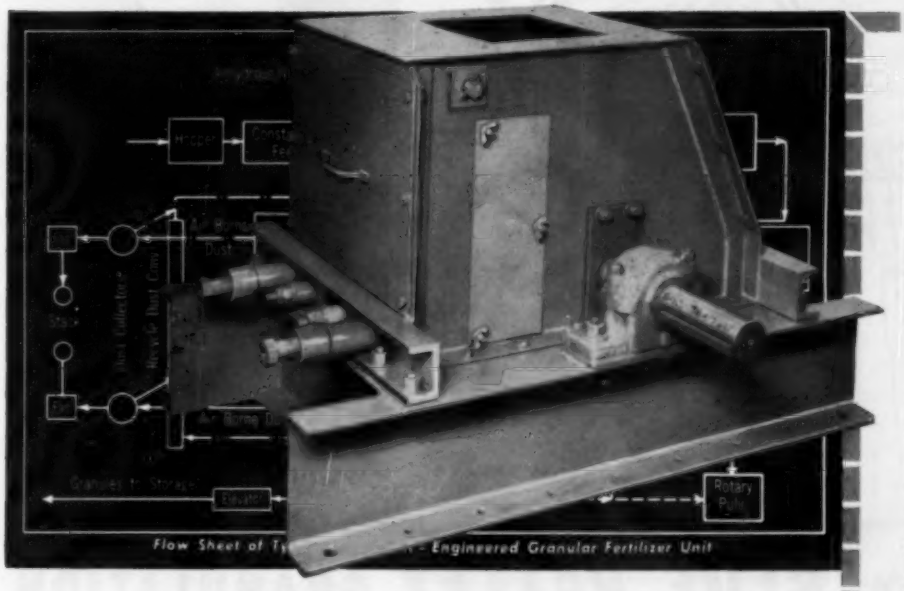

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Gibberellic Acid Effect on Plant Diseases Among Reports at APS Meeting at Stanford

REPORTING on their experiments with the new plant growth hormone gibberellic acid, before the American Phytopathological Society meeting at Stanford University, Palo Alto, California, August 26-28, scientists A. E. Dimond and Malcolm Corden noted that effects from gibberellic acid were radically different from those of such other plant growth-regulating hormones as 2,4-D and indolacetic acid, which always reduce plant disease severity.

There is little likelihood that gibberellic acid will prove valuable in the direct control of plant diseases, but its effects on disease severity may limit its use as a plant growth regulator. In tests with tomatoes, treatment of the plants with from 5 to 20 parts of gibberellic acid per million of carrier stimulated plant growth for about two weeks, the low concentrations reduced the severity of Fusarium wilt disease; the high concentrations increased its severity. Tomato plants were inoculated with the Fusarium wilt fungus following treatment with gibberellic acid.

Two New Antibiotics Show Promise

The discovery of two new closely related antibiotics that show promise in controlling important plant diseases caused by fungi, is announced by Pabst Laboratories, Milwaukee. These antibiotics, phytoactin and phytostreptin, gave effective control of such fungus plant diseases as early blight and late blight of tomatoes, bean rust, barley blight, and oak wilt in laboratory and green house tests.

In a conclusive series of greenhouse experiments, phytoactin almost completely controlled early blight fungus of tomato when applied to infected plants as a water spray at concentration of 63 parts of antibiotics per million of water. Phytostreptin sprays were effective against the same disease at 55 parts per million. Against late blight of tomatoes and bean rust, the two new materials were nearly equally effective—at about 90 parts per million against late blight and at about 15 parts per million against bean rust.

Streptomycin Controls Disease of Beans

Halo blight, the only economically important disease of commercial green and dry beans grown in the semi-arid interior regions of British Columbia, has been successfully controlled by field spray treatment with the antibiotic, streptomycin sulfate. Plant pathologist G. E. Wooliams of the Canadian Department of Agriculture, reported these results, saying that streptomycin sprays applied to infected beans at a concentration of 500 parts of active antibiotic per million of water proved most effective in field tests during the past two years. Sprays were applied three times at weekly intervals after halo blight symptoms began to show up on the bean plants. Halo blight symptoms completely disappeared and failed to re-appear during the remainder of the growing season. However, fields planted with beans from the sprayed crop the following year developed about 6 per cent infection.

Cytovirin Controls Virus

Reporting on the potentiality of a new antiviral chemical, cytovirin, Merck scientist Reed A. Gray said that spraying with cytovirin prevented the development of southern bean mosaic virus in pinto beans and tobacco mosaic virus in tobacco. These outstanding results were obtained with pure cytovirin diluted with water and sprayed on the plants one hour after they had been inoculated with the virus. Against southern bean mosaic, disease development was prevented with a spray containing

(*Continued on Page* 107)

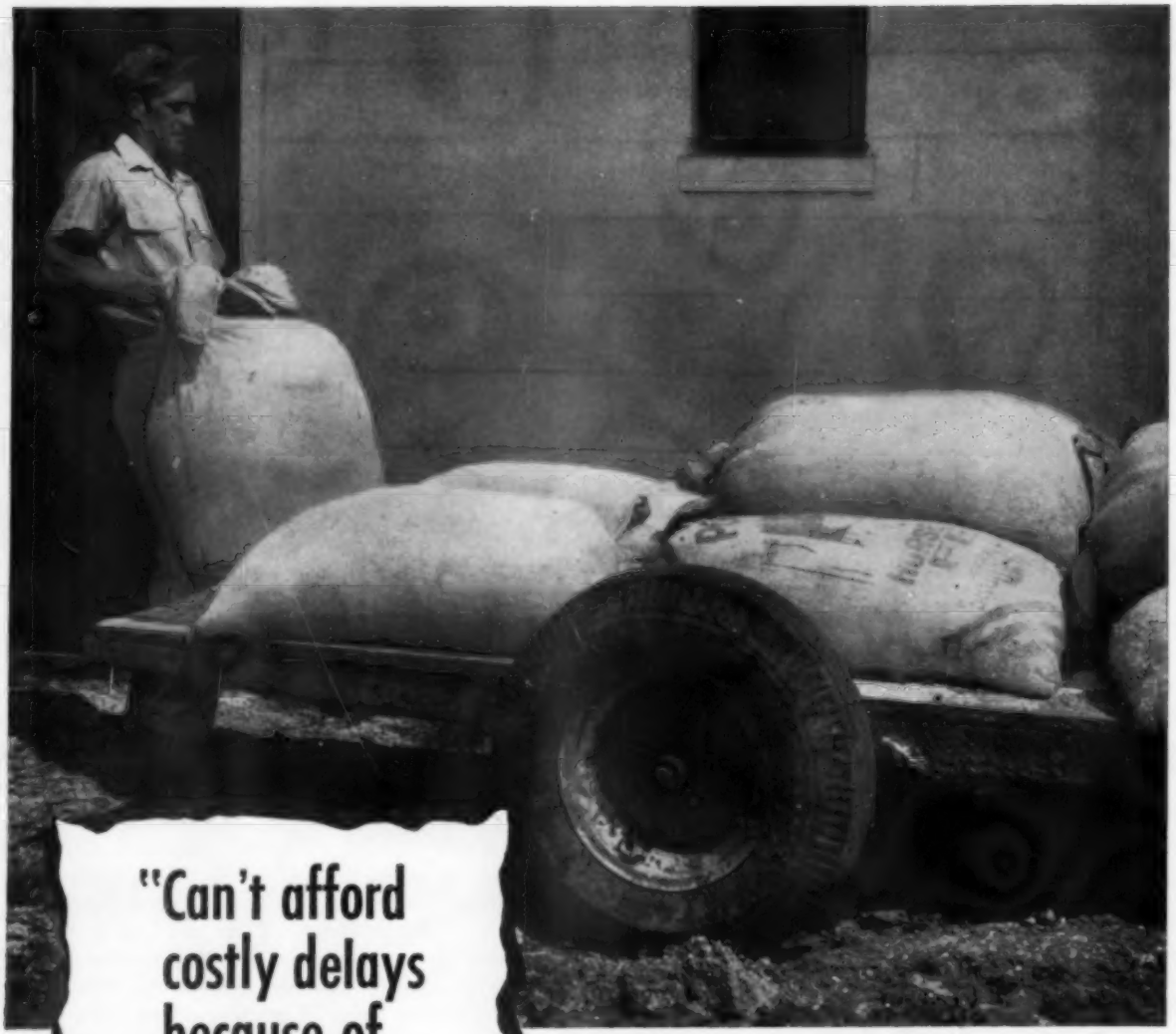
Research on Gibberellins Reported at A.I.B.S. Meeting

A SERIES of papers reporting on results in this past season's experimental work with gibberellins on a series of crops was presented at the meeting of the American Institute of Biological Sciences held at Palo Alto, Calif, August 26-28. In connection with the meeting Merck & Co., one of the producers of gibberellins, held a press conference and buffet attended by over one hundred scientists who are taking an active role in research on the gibberellins. Robert J. Weaver, associate viticulturist at the University of California, Davis, reported at Palo Alto that treating Thompson seedless grapes with gibberellin compounds at 50 parts per million resulted in highly significant berry enlargement, eliminating the necessity for costly and yield-limiting girdling procedures. Another effect of the gibberellin treatment was elongation of cluster parts, which decreases rot and aids sanitation. Used on Black Corinth grapes, the gibberellin compound produced an excellent set, and berry weight increased to as much as twice that of grapes in which set was induced by girdling.

Another progress report from three U. of C. Davis specialists in vegetable crops, Lawrence Rappaport, Herman Timm and Laverne Lippert, indicated that a gibberellin solution is effective in stimulating early sprouting of potatoes. After a five minute immersion, potatoes were induced to sprout one or two weeks early. Their findings were also reported in a paper presented at the meeting of the American Institute of Biological Sciences.

Merck & Co. have over 33 grant-in-aid research projects currently being worked on at leading agricultural colleges from coast to coast. It is reported that Merck's "Gibrel" is merely the company's first step in entering the agricultural chemical field, and that following its successful introduction Merck may later bring out other agricultural chemical products and specialties.

At the annual convention of the American Agricultural Editors Association, held in Washington, September 25-27, samples of Gibrel-treated Thompson's seedless grapes were to be distributed to the editors for comparison with untreated grapes.★★



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LISTENING POST

By Paul Miller

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Epidemics and Identification Section, Horticultural Crops Research Branch, United States Department of Agriculture, Beltsville, Maryland.

Tests with Antibiotics for Control of Rose Crown Gall

PETER A. Ark and W. S. Sibray, of the University of California and the California State Department of Agriculture, respectively, write * that:

"Crown gall . . . (caused by [the bacterium] *Agrobacterium tumefaciens*) is a serious disease in many rose nurseries in California . . . especially . . . where rotation is used to only a limited extent or not at all. Since the . . . organism is strictly a wound parasite, . . . practices that result in injury to the rootstock are an important factor in infection. Many nurserymen provide for callus formation on rose cuttings after removing the buds from the part of the stem that will be underground. The cuttings are then inserted in well-prepared soil to the depth of four or more inches. The soft callus tissue is easily bruised and scratched [by sandy or rocky particles] when a callused cutting is pushed through the mulch paper and into the soil. The obvious injuries produced in this manner provide very convenient portals of entry for crown gall bacteria.

"To prevent the occurrence of the disease in roses in the nursery, a program of antibiotic dip treatments was carried out in 1955 and 1956 in a rose nursery where the annual loss from crown gall had been large. Commercial cuttings of . . . Paul's Scarlet and Manetti, [not] pre-callused, were used in 1955 (Table 1, Burr Multiflora was not listed in the Table) As noted below very little crown gall developed on this rootstock. Materials tested for control were used at the concentrations given in the table. A penetrant compound of 1% glycerine and 1% dipotassium phosphate was used in combination with the streptomycin solutions. To promote better callusing of the cuttings, indole acetic acid (100 ppm) was added at the time of dipping . . . The treatments were performed in a closed, unheated barn, and the duration of each treatment was two hours.

"In the Burr Multiflora rootstock, very little crown gall developed under conditions which resulted in a considerable amount of the disease in the Manetti and Paul's Scarlet varieties. Thus, out of 558 Burr Multiflora plants dug in the check, there were only six plants with small galls, a 1.07% incidence of the disease.

In the plot with the penetrant and another plot with 600 ppm streptomycin, plus penetrant, there was only one diseased plant in each of the two lots of 554 and 560 plants examined. The Burr Multiflora appears very resistant to crown gall under field conditions, and should be considered for use where there is no objection to this stock.

"Streptomycin dips up to 200 ppm gave some control of crown gall (Table 1). With Manetti rose, control was obtained with streptomycin and tetracycline dips, while with Paul's Scarlet commercial control was not so good.

*Peter A. Ark and W. S. Sibray. Efforts to control crown gall of roses with antibiotics. *Plant Disease Reporter* vol. 41, no. 5, pages 449-451. May, 1957.

Table 1. Experimental control of crown gall on two varieties of roses in Alameda County, California, summer 1955. Plants were dug and read on August 19, 1955. [Table from Ark and Sibray, reference cited.]

Treatment	Number of plants dug		Number of plants with crown gall		Percent disease		Percent disease compared with check		Percent control	
	Manetti	Paul's Scarlet	Manetti	Paul's Scarlet	Manetti	Paul's Scarlet	Manetti	Paul's Scarlet	Manetti	Paul's Scarlet
No treatment (check	179	33	99	22	55.3	95.7	100	100	0	0
Streptomycin dip										
100 ppm	283	12	37	5	13.1	41.7	23.7	43.5	76.3	56.5
200 ppm	332	44	15	28	4.5	63.6	8.1	66.4	91.9	33.6
Tetracycline dip										
50 ppm	314	18	116	11	36.9	61.1	66.7	63.8	33.3	36.2
100 pm	317	30	58	17	18.2	56.7	32.9	59.2	67.1	40.8

"There is significant difference in susceptibility of rose cuttings to crown gall, Paul's Scarlet being the most susceptible.

"It appears likely that different rose varieties absorb the streptomycin differently. The penetrant used in the experiments seems to retard the movement of the antibiotic in rose cuttings, in spite of the fact that its constituents have been reported to favor penetration and movement of streptomycin in plants . . . Streptomycin dusts containing active streptomycin up to 2000 ppm did not give significant control of crown gall.

"Although there was considerable variation in the action of the streptomycin in the different tests, it appears that significant control of crown gall was obtained in Manetti when a dip of 500 ppm streptomycin for two hours was used.

"It should be mentioned that both streptomycin and tetracycline antibiotics moved into all parts of the cuttings and produced varying degrees of chlorosis on the first few leaves of the opening buds, but this did not show up in the subsequent foliage and the plants did not seem to show any other signs of distress."

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head — Plant Pest Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the U. S.

By Kelvin Dorward

European Corn Borer Heavy In Some Areas

BY the latter part of August, the second-brood pattern of the European corn borer was fairly well-shaped. In Rhode Island, injury by second-brood larvae was light as were the populations in Maryland. Delaware reported increasing populations with larvae numerous in silks, ear tips and whorls of field corn. Extensive and possible severe damage expected in the central and southwestern districts of Minnesota. Heavy populations of egg masses ranging from 66-210 masses per 100 stalks were superimposed on a rather heavy first generation. First-brood borers were heavier in northern Wisconsin than in the remainder of the State. Recent cool weather in the northern part of the state was expected to limit the emergence of second-brood moths. In the southern part, second-brood moths were numerous in light traps but the weather was expected to slow down hatching. By late August, moth emergence in Iowa was almost 100 per cent complete. In Boone County, an average of 32 fields showed an accumulative total of 138 egg masses per 100 plants with few more expected for remainer of the season.

The second-generation in Nebraska was heavier than anticipated with egg mass counts of 50-240 per 100 stalks whereas in Ohio, egg deposition was on the decline and the fall infestations were expected to be light. Third-generation larvae were appearing in eastern Arkansas counties by the latter part of August. In Missouri, egg mass counts for a third generation were up sharply with counts ranging from 80-320 per 100 stalks in the southeastern area.

Spotted Alfalfa Aphid Building Up in Areas

THE spotted alfalfa aphid, which this summer was rather light compared to recent years, was building up in several areas by early September. Populations in the Fallon areas of Churchill County, Nevada were higher than at the same time last year. Many fields were requiring treatment before cutting. The aphid was abundant in southern Utah, and a substantial spray program was underway in Millard County. Eastern Colorado reported the heavier populations for that state, with populations up to 10,000 per 100 sweeps. New Mexico populations were generally light to medium. However, some heavy infestations were reported from Eddy and Chaves Counties.

General increases in spotted alfalfa aphid populations were noted throughout Kansas. However, predators were present with their population apparently varying with the aphid population. Oklahoma also reported an increase in aphid population in central counties, but with numerous predators. In alfalfa fields of northeastern Nebraska, populations were building up to severe infestations, but the increase was slow in the southern and central part of the state. A few fields in southwestern Illinois were carrying damaging populations, and in Indiana, the first specimens of the year were taken August 26-28, in 10 southern and southwestern counties.

Light populations of the aphid were reported from Texas, Louisiana and Virginia. Heavy spotted infestations were reported from Alabama and North Carolina.

Among other cereal and forage pests, the corn earworm was very active. Heavy populations were recorded on both field and sweet corn in Delaware and Maryland. Soybeans and milo were damaged by the pest in parts of Virginia, soybeans and peanuts in North Carolina. In Illinois, corn earworm infestations ranged up to 60 per cent with some fields having 3 larvae per ear. Populations were building up in sorghums in Texas, Oklahoma, Missouri, Alabama and Georgia. Field corn was 100 per cent infested with corn earworm in the Arkansas Valley and on the western slope of Colorado. In New Mexico, heavy populations of the pest were in field and broomcorn throughout the state and severe damage was experienced in Quay and Curry counties.

The potato leafhopper population remained rather high in some states. Counts ranged from 2 to 23 per sweep on alfalfa in Montgomery

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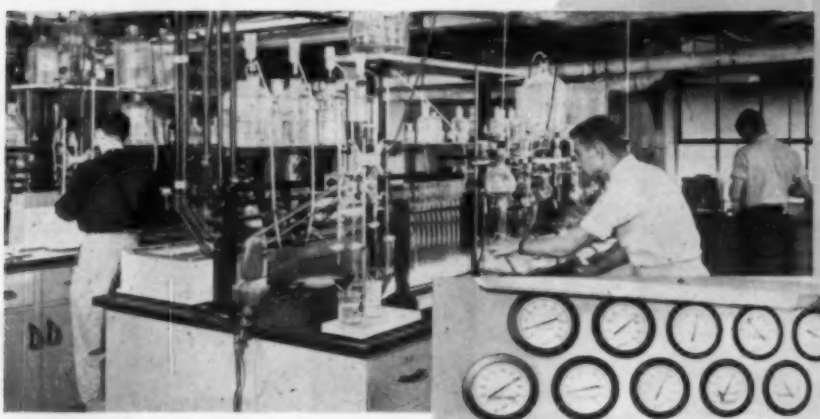

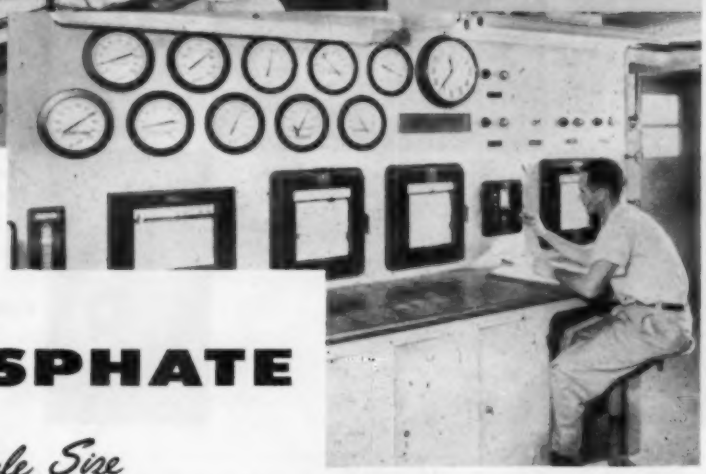

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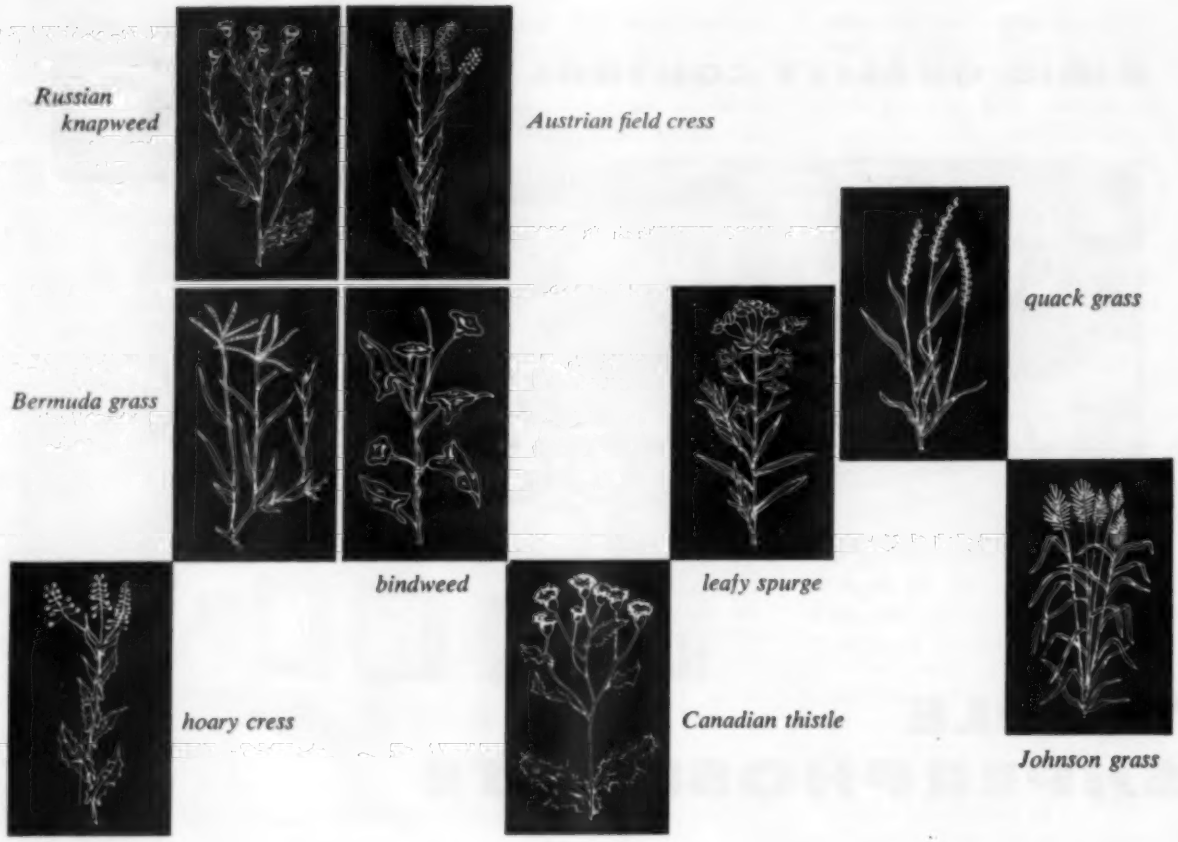

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and Frederick counties, Maryland. The insect in latter August in Wisconsin caused greater reductions in alfalfa yield than all other insects. Considerable loss was expected in southern Indiana, where heavy nymphal populations were developing by early September. In western and southwestern Illinois, adult counts were 60-100 and nymphal counts were 0-400 per 100 sweeps. High populations of 180-360 per 100 sweeps were also recorded in the Republican Valley of Nebraska.

Vegetable and Cotton Pest Activity in August and September

AMONG the vegetable pests, mites were very active during the latter part of August and early September. Control of the two-spotted spider mite was necessary on potatoes in the Quincy, Washington area and on hops in the Moxee and Wapato areas of the same State. Beans and potatoes were infested in the Hazelton and Rupert, Idaho areas. In the Thief River Falls area of Minnesota raspberry plants and evergreens were seriously infested. Tomato plantings were being damaged in New Jersey and light infestations on beans were reported from North Carolina.

The tomato russet mite was more serious in Utah than it has been for several years. Infestations were reported from Box Elder, Davis and Weber Counties of that state and control programs were active. It was estimated that the pest was responsible for a loss of about 125 acres of tomatoes due to "sun scald." The pest was also reported from Sussex County, Delaware and Juniata County, Pennsylvania.

Aphids were also active on vegetables in areas throughout the United States. Aphid populations were on the increase in Maine, with numbers up to very heavy being recorded on potatoes in the Presque Isle area. Colorado also reported increases on potatoes in the northeastern counties as well as the San Luis Valley in the south central part of the State. Wisconsin and Washington also reported increases, with control being difficult in some commercial potato plantings in Wisconsin.

The tomato fruitworm in late August caused damage to commercial tomato plantings in New Mexico, Nevada and Delaware. Hornworms were also active on the same crops in New Mexico and Delaware.

Among cotton insects, the boll weevil was still causing concern in late August in parts of South Carolina and Louisiana. Tennessee was concerned because of the heavy populations of weevils in Lake, Obion and Dyer Counties where weevils seldom cause trouble. Although normal for this season of the year, sharp rises in infestations were noted in Arkansas.

The cotton bollworm was on the increase in South Carolina, Tennessee, Louisiana, Oklahoma, Missouri, Texas, Arizona and California. The cotton leafworm, which in recent years has not been a serious cotton pest, this year has required control in South Carolina, Alabama, Louisiana, Texas and New Mexico.★★

New Carbide Insecticide

A new experimental insecticide, to be sold under the trade-mark Sevin, is undergoing extensive tests by state and federal agricultural experiment stations across the country. The product, manufactured by Union Carbide Chemicals Co., Division of Union Carbide Corp., New York, introduces a different type of chemistry to the insecticide field.

Sevin is an aryl urethane; its chemical name is 1-naphthyl N-methyl-carbamate. Carbide expects to market the insecticide after collection of toxicity data and compliance with federal pesticide regulations are completed.

Formerly called compound 7744, Sevin has controlled codling moth, apple aphids, and plum curculio on apples, and pink bollworm, bollworm, boll weevil, and other troublesome cotton insects. In addition, it is being widely tested on vegetables, with some experimental applications on forage, tobacco, and ornamentals.

Further data on the compound is available from Union Carbide Chemicals Co., New York.

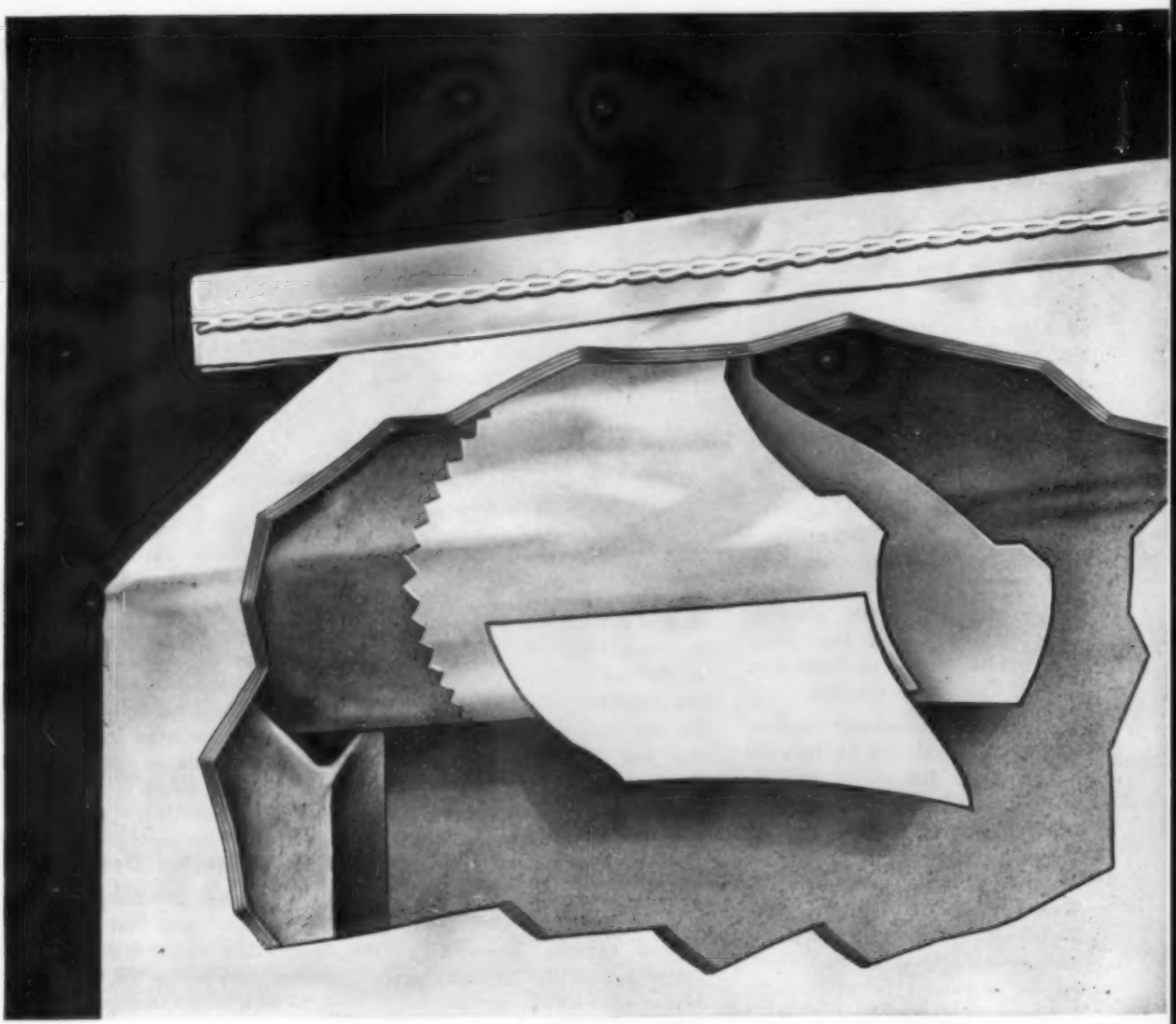
Control Procedures Scheduled for NPFI Meeting October 17th

A conference on chemical control procedures and problems in the fertilizer industry, sponsored by the Chemical Control Committee of the National Plant Food Institute, will be held in the Park Room, Shoreham Hotel, Washington, D. C., on October 17. Dr. Vincent Sauchelli, Chemical Technologist for the Institute and Chairman of the Committee explained that the meeting will be scheduled for the period when the Association of Official Agricultural Chemists meets in Washington, to enable many chemists attending the other meeting to participate in the conference.

The program for October 17 follows:

MORNING: Introductory remarks by Dr. Sauchelli; "The Chemical Analyst in Today's Industry" by Dr. Walter J. Murphy, Editorial Director, American Chemical Society; "F.A.R.I. Chemical Control Project" by Robert P. Thornton Laboratories; "The Control Chemist—Key Man in Modern Fertilizer Production" by M. D. Sanders, Director of Research, Swift & Company, Plant Food Division; "Collaborative Study on Triple Superphosphate" by H. L. Marshall, Olin Mathieson Chemical Company.

AFTERNOON: "The Magruder Sample Work" by Dr. Sam Thornton, F. S. Royster Guano Company; "Need for Standard Samples of Phosphate and Potash" by Carrol H. Perrin, Research Chemist, Canada Packers Ltd.; "The Relationship of the Chemical Control Office to the Local Fertilizer Industry" by A. S. Carter, Director, Seed Control and State Chemist Services, Purdue University; "Some Comments on Sampling Instruments" by J. R. Archer, International Minerals and Chemical Corp.; "Rapid Method for Determining Urea in Ammonia Solutions" by J. A. Smith, Sohio Chemical Co.; "Review of Nitrate-Chloride and Tetraphenyl Boron Method" by E. D. Schall, Indiana State Chemist Office; followed by a general session.



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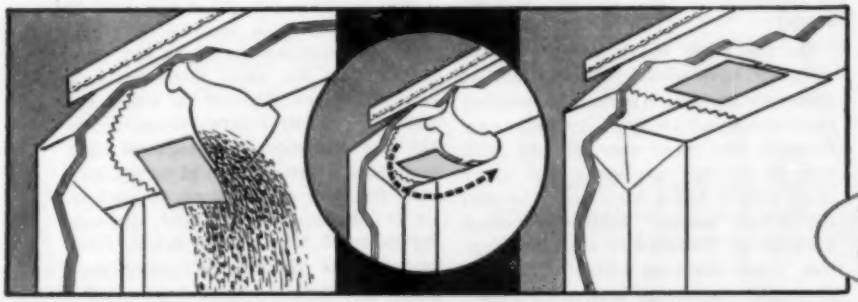

WON'T CLOG . . . This view shows how the Magic Yellow check flap falls freely aside from the valve slit, giving no interference whatever to proper operation of the packing spout. The sleeve won't choke or clog the packer.

POSITIVE CLOSING ACTION . . . This diagrammatic picture shows action as the flap starts to close over the valve slit.

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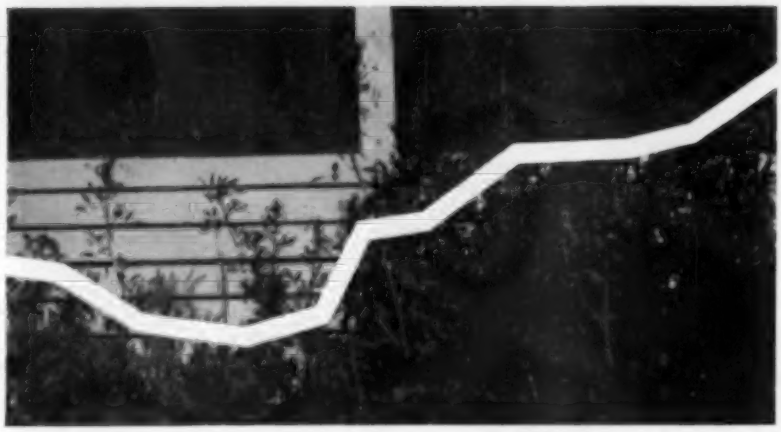


In a Washington State test, sweet clover responds to moly fertilization with yield of 1.5 tons of hay per acre (area at right). Control area (left) yielded only 0.7 ton per acre.

(Photo courtesy State College of Washington).

Average yield or high production? Moly may make the difference

Moly can give striking increases in yields, even on land farmers thought was "good enough"

During the past few years agronomists and many farmers have witnessed the dramatic upturn of crop yields when small additions of molybdenum were made to moly-starved soils. These results have been widely reported, and today the more obvious symptoms of moly-starvation are quickly recognized by most county agents.

But how about the much larger areas where moly-deficient soils might be described as undernourished rather than starved? Here moly can make the difference between average yields, average quality, average profits and high yields of premium quality crops that mean extra income.

At the present time these areas of potential response to moly treatment are known to include large parts of the eastern U.S. and much of the arable land of the Pacific Northwest. They take in many productive farms whose owners, lacking a standard of comparison, are reasonably satisfied with present yields.

In these areas, tests by experimental stations and growers alike have established that moly applications can boost yields by 12 to 93%. Although such improvements are not perhaps as spectacular as in moly-starved soils, they have already added to the profits of individual farmers. Broad-scale treatment of these undernourished soils can contribute substantially to overall farm production.

How Moly Works

A fact that has emerged from many studies of micronutrients is that moly is essential to nitrogen fixation. Legumes require moly for the fixation of atmospheric nitrogen by the bacteria in their root nodules. All crops need it to reduce nitrates to nitrogen—the first step in protein synthesis.

When there isn't enough available moly in the soil to satisfy plant requirements, crops literally starve to death (as in the case of serious, visible deficiencies), or achieve only a fraction of their potential growth (as in the case of many fields with "normal" productivity).

On the other hand, small amounts of moly have given both substantial increases in crop yields and marked improvement in quality to many farmers who were once content with fair to average production. In many cases alfalfa has a higher protein content when "normal" fields are treated with moly. Cauliflower runs to large size, more succulent flavor.

Consider the effect of moly on a typical few of the 30-odd crops for which responses have been reported:

Alfalfa—In field tests in New Jersey, Dr. Harold J. Evans of Rutgers University obtained an average increase in yield of 13%, marked improvement in protein content. In field tests in Spokane County, Washington, Dr. H. M. Reisenauer of the State College of Washington found that treating molybdenum deficient fields with moly increased yields an average of 40%.

Melons—A Virginia grower reports that with moly treatment he gets an average of 7 runners per vine with each runner bearing a large melon. Untreated plants bear fewer runners, much smaller fruit.

Peas—In eastern Washington and northern Idaho, where both dry edible and seed peas are a major crop, commercial use of moly is producing more peas per pod, more pods per vine. And vines are longer, easier to harvest. Yield increases in commercial tests have averaged 63%. Many farmers realize a return of $10 on each dollar invested in moly.

Cauliflower and Lettuce—Growers on Long Island and in upstate New York, in Rhode Island and mid-New Jersey report more vigorous cauliflower plants with heads of better quality. Color and leaf structure of lettuce improved. Yields were consistently higher than for untreated fields.

Testing is Easy

Although crops vary in their moly requirements and responses vary with soils, there is one sure way for a grower to find out whether he can increase the yield and quality of a particular crop on a particular soil: run a field test. It's easy to do.

A stock solution for such tests is made by dissolving one ounce of sodium molybdate in one gallon of water. For vegetable crops, select and mark one or more rows through the center of the field. Mix three cups of the stock solution with one gallon of water and apply to the test rows, using about a quart to a 250-foot row. Compare the test rows with untreated rows every other day. Check yields and quality against untreated areas at harvest.

For legumes, lay out a test plot 10 yards square in a location that will make it easy to compare with untreated soil. Follow the usual fertilizer plan, but do not use nitrogen on either the test plot or the control areas. Spray the test plot with three cups of stock moly solution to a gallon of water. This may be done at the time of seeding, or to an established stand. Because increases of 25% or less are difficult to evaluate visually, clipping tests should be made.

For detailed information on the handling of moly test plots write Climax Molybdenum Company, Dep't. 43, 500 Fifth Avenue, New York 36, N. Y.

WASHINGTON REPORT

By Donald Lerch

MOST of the states in the fire ant area are ready to put up cash and personnel to control this pest which has made headlines from coast to coast. Likewise, the U. S. Department of Agriculture is set to launch its control program closely coordinated with state activities.

Florida, Louisiana, Georgia, North and South Carolina, and Arkansas are among the first states to move into the fire ant control program. Several others states appear ready to enter, and with one or two exceptions, there may be 100% state action on this problem.

The U. S. Department of Agriculture emphasizes that its funds of $2,400,000 are to be administered by Department personnel.

Detailed plans for Department operation are being slowed down by the Bureau of Budget. The Administration did not ask Congress to raise the debt limit ceiling above the $275 billion dollar mark. The government is thus committed to live within this figure, and expects to be pinched the most between now and Christmas. Consequently, the Bureau of the Budget is holding down on actually allocating appropriated funds to government agencies. This same slow down has caught the Food & Drug Administration which did not receive its increased appropriations for the most part during the first quarter of the new fiscal year.

However, Dr. W. L. Popham, assistant administrator, Agricultural Research Service, expects that all of the appropriated money for fire ant control will be made available to the Department. Likewise the $1,600,000 for screwworm eradication in Florida should be forthcoming shortly.

* * * * *

Fifty thousand traps in Florida have failed to turn up a single Mediterranean fruit fly during a 45-day period. This is the kind of thing that makes those who have been battling the fruit fly reach for the telephone and place reservations for fall hunting and fishing trips. While no scientist is yet shouting success, it looks as though the campaign is equalling or surpassing the expectations of even the most conservative.

* * * * *

The trend toward larger farm units is continuing and increasing in intensity. This development has social, economic, and political overtones.

From a business point of view, marketing men I have talked to feel this trend would improve the opportunity for the industry to serve commercial agriculture. There is some evidence that the larger, more commercial type of farm is a much better market for pesticides and fertilizers than the "self-sufficient farm" and the smaller economic units in general. In the animal and poultry field it's clear that concentration of capital has put marketing and sales on a more technical basis, and has improved the opportunity for income when selling is closely hitched to scientific performance.

It would seem then that the marketing climate for the entire agricultural chemicals field is moving toward fewer, but larger, customers, with some parts of agriculture racing far ahead of others as this trend gains momentum. Washington reacts to the effect, not the cause. There are some political leaders in Washington who would retard this trend and change it by artificial means. Most economists I've talked to feel that whatever Washington does, it would have only temporary effect and would be more in the category of a delaying tactic.

* * * * *

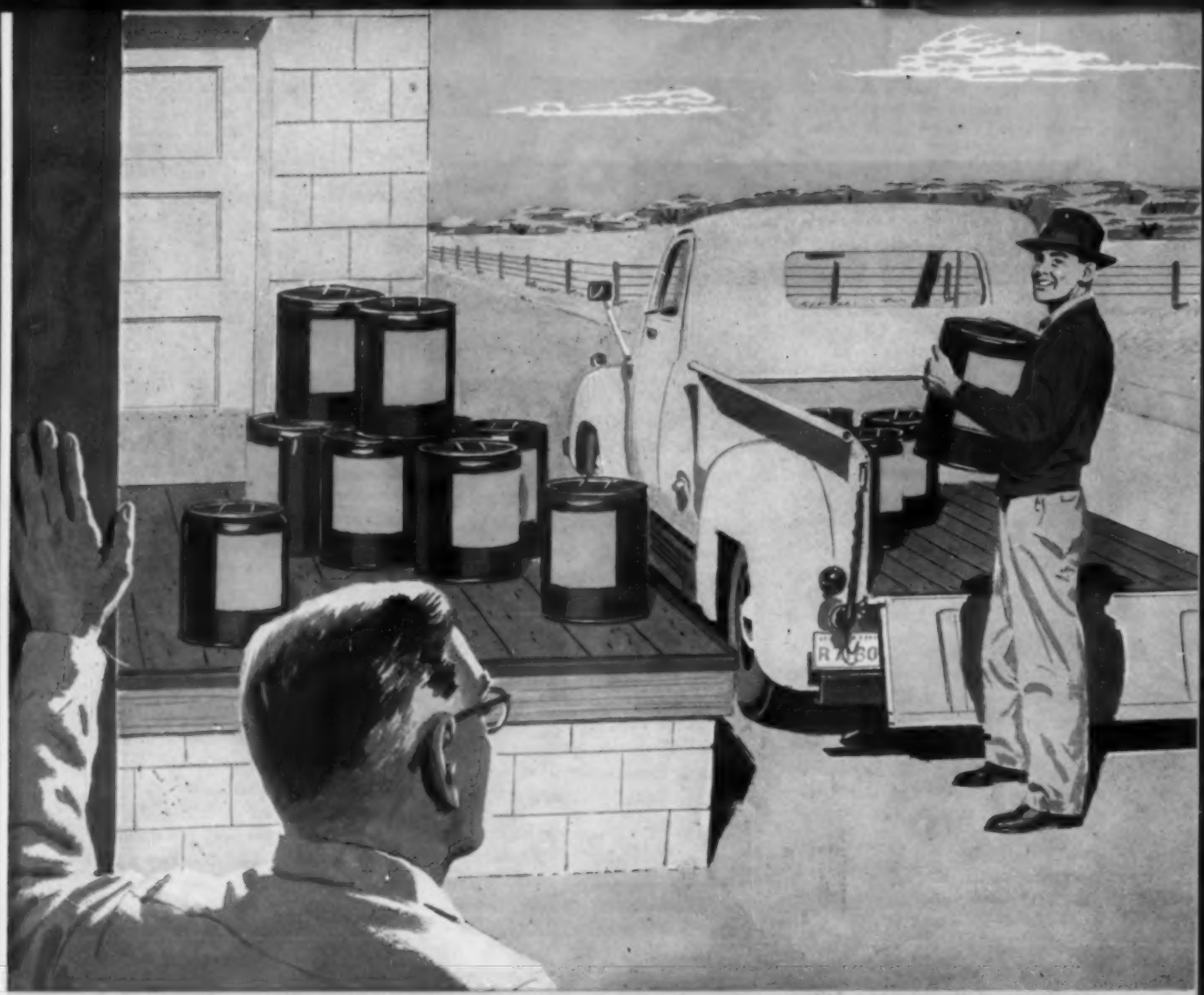
Washington is speculating on how Justus C. Ward, head, Pesticide Regulation Section, U. S. Department of Agriculture, will administrate his position as he succeeds Dr. W. G. Reed. Ward's authority over the pesticide industry is a sizeable one, and industry members are much interested in the initial decisions and activities of his office. They are looking for clues on how he intends to administer his program.

* * * * *

Louis Wilson, Director of Information, National Plant Food Institute, is continuing to receive requests for his farm radio recordings, released periodically to leading farm directors in the U. S., Canada, and other selected countries. Each feature release has been receiving new requests, and his total to date is the highest of any trade association in the agricultural field. Latest release features these speakers and subjects:

"Using Improved Forages Efficiently" by Dr. William M. Myers, Vice President, American Society of Agronomy, & Head, Dept. of Agronomy & Plant Genetics, University of Minnesota.

"Open Season for Fertilization" by George H. Enfield, Extension Agronomist, Federal Extension Service, USDA.



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"Success With New Crop Varieties" by Dr. Martin G. Weiss, Associate Director, Crops Research Div., Agricultural Research Service, USDA.

"Better Food for Less Money" by Werner P. Meyer, Assistant to the Director, Research Communications, State Experient Stations Div., Agricultural Research Service, USDA.

* * * * *

Washington statistics on increasing personnel of the U. S. Department of Agriculture show some sizable boosts. The following table shows how pest control operations compare with other Department activities:

	Personnel Increase
Disease and pest control	344
Research programs	2106
Construction of forest access roads	1303
Soil Conservation Service Technical assistants	1325
Agricultural Attaches	349
Brucellosis eradication	2408
Watershed development	1589
Soil Bank	2265
Increased volume of price support operations	2505

Over-all, U. S. Department of Agriculture personnel now stand at 78,000, representing an increase of 25% since 1953.

Just about every Secretary of Agriculture issues a statement upon taking office that he intends to reduce the number of personnel in his Department. Usually he succeeds, and for one or two years USDA personnel shows a considerable drop. From then on, numbers increase and by the time the Secretary leaves office total personnel are far above the temporary dip following his appointment. What has happened during Benson's term of office shows that politics has little to do with this situation.

* * * * *

Plan to be meeting here in Washington with a group of foreign editors and journalists who are in this country on a joint USDA-International Cooperation Administration exchange study tour—September 26 to Dec. 14.

During past trips, individual companies and trade associations have met with individuals or the entire overseas group and my experience in attending some of these meetings and hearing from these people after they return to their countries is that such meetings are highly beneficial to them and apparently also to U.S. industry.

* * * * *

The speed with which the fertilizer business is changing shows up in part this way. One young man who has built quite a successful business in the mid-west recently turned down a lucrative 3-year contract as a consultant to the Colombian government. Reason he did was that in his opinion the speed of change in fertilizer production and selling is so great that to be out of it for three years would be to accept too great a penalty.

He was referring primarily to the sizeable shift to relatively small mixing and sales units. Even with the success industry was able to achieve in the holddown on freight rates, the high cost of shipment for plant food results in a host of situations where individual entrepreneurs have special advantage because of their strategic location.

* * * * *

You can expect to be hearing a great deal about industrial use of agricultural surpluses. Washington is moving steadily in the direction of urging the chemical industry further into this field. Before this trend runs its course, Washington probably will have some money to offer companies to subsidize research. There's even some thought of subsidizing the actual use of agricultural commodities for industrial purposes.

USDA Revision of Labeling Rule

To clarify its policy of not endorsing specific commercial pesticides, the U. S. Department of Agriculture has proposed an amendment to regulations for labeling these products.

Under the proposed change USDA would consider a pesticide misbranded if its label carried "any statement directly or indirectly implying that an economic poison or device, or any ingredient or constituent element thereof, or combination of ingredients, is recommended or endorsed by any agency of the Federal Government."

Officials of U.S.D.A.'s Agricultural Research Service charged with enforcing these regulations point out that labels on some commercial pesticides bear such claims as "Formula Recommended by the United States Department of Agriculture," or "Active Ingredients Recommended by the United States Department of Agriculture." Claims of this kind have been interpreted to mean the product itself is USDA-endorsed.

The notice in the U. S. Federal Register gives 30 days for any interested person to express views on the proposed amendment to the Regulations for the Enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act. Written views may be sent to Plant Pest Control Division, Agricultural Research Service, USDA, Washington 25, D. C.

*

Agricultural Chemists in Wash.

Clement Raphael Shabetai, scientific advisor to the permanent international bureau of analytical chemistry in Paris, will be a featured speaker at an opening session of the Association of Official Agricultural Chemists, meeting at the Shoreham Hotel, Washington, D. C., on October 14, 15, and 16. Dr. Shabetai will discuss the work of his organization and report on analytical methods currently used in European countries for foods, food adulterants, and feeds.

A presidential address on "The Land Grant College and the AOAC" will be given by Dr. M. P. Etheredge, Mississippi State College and president of AOAC. Other reports at the three day meeting will include:

"Sampling and preparation of samples of fertilizers" by E. D. Schall, Purdue University, J. G. A. Fiskell and associates, Florida Agricultural Experiment Station; "Analysis of fertilizers" by J. A. Brabson and W. B. Wilhide, Tennessee Valley Authority; K. G. Clark and associates, U. S. Department of Agriculture.

NEWS about the TRADE

O-M Names Baerman Mgr.

G. D. Baerman

The promotion of G. D. Baerman to manager of the insecticides products department, Olin Mathieson Chemical Corporation, has been announced by John C. Logan, vice president and general manager of the industrial chemicals division.

Mr. Baerman formerly was manager of field sales in the same department. He entered the chemical business in 1946 and joined Olin Mathieson in 1954 as assistant sales manager of the insecticide products department.

Mr. Logan also announced three other appointments in the insecticide products department:

C. M. Norton becomes assistant manager. In 1946 he joined Genessee Research Corp., which is now part of Olin Mathieson. In 1955 he became assistant to the vice president in charge of fertilizers and insecticides, and later was made comptroller for the insecticide operations.

Dr. Alfred Weed has been placed in charge of household insecticides; and Paul Williams will be in charge of insecticide sales for the midwest territory.

•

Wise Purchases Homar Co.

The assets of the Homar Agricultural Chemicals Co., Wichita, Kans., have been purchased by the Steve Wise Co., Wichita, from T. J. Morris, receiver of the Homar Co.

Through this expansion, the Wise Co. will sell insecticides and weed killers through 81 dealers in Kansas, Missouri, Oklahoma, and Nebraska. The Homar division will formulate chemicals and build trailer-type sprayers. The company furnishes sprayers which are rented to farmers by dealers.

•

Terminate Diamond Black Leaf

Operations of Diamond Black Leaf Company, producer of agricultural chemicals for farm use and lawn and garden products for home use, were integrated last month with the business interests of Diamond Alkali Company, Cleveland, Ohio.

Loren P. Scoville, general manager of Diamond Alkali's Chlorinated Products Division, said that the former Diamond Black Leaf Company organization now becomes Diamond Black Leaf Products, a unit of Diamond Alkali Company.

"The consolidation of Diamond Black Leaf operations and the addition of the extensive research and production facilities of Diamond Alkali will enable Diamond Black Leaf to provide better service to customers of both farm and home products."

•

Purcell of Munson Dies

William J. Purcell, general manager of the Munson Mill Machinery Co., Utica, New York, passed away in his sleep on September 14, at the age of 52. He is survived by his wife and their daughter, Jane.

In 1948, Mr. Purcell was appointed as general manager of the 132 year old Munson Co., and in 1951 became vice president. During his nine years with the company, he was instrumental in redesigning and improving many of the Munson batch mixers, mills, etc.

NATA in Dallas, Nov. 13-15

The National Aviation Trades Association will meet at the Adolphus Hotel, Dallas, November 13-15. The Agricultural Activities Division will hold meetings pertaining to aerial application at this convention.

Among the discussions will be a discussion of the results of the Agricultural Aviation Survey, covering aerial applicator operations for 1956. Gale Hanson, United-Heckathorn, Richmond, Calif., will lead a panel discussion on "Government, Industry, and Private Contract Operations." A review of regulator matters, including the CAA operating manual for aerial applicators, problems relating to large multi-engine aircraft operations, etc., are also on the program.

•

Pest Control Meeting

The Alabama Association for Control of Economic Pests is planning one of the biggest pest control meetings in the history of the Southeast. The meeting, which will be held in the State Coliseum in Montgomery, Jan. 20 and 21, is being called Pest-O-Rama.

•

NPFI Appoints N.E. Director

Dr. W. H. Garman has been appointed regional director for the National Plant Food Institute in the Northeastern States, it was announced last month by Dr. R. Coleman, executive vice president of the Institute.

He is the first of four regional directors to be appointed under the Institute's program to expand its research and educational activities. In addition to the four regional directors, other field personnel will be added to the Institute's staff to work under the

regional directors in servicing particular states and areas.

Dr. Garman, who is chief agronomist for the Institute, will continue to serve as its chief agronomic consultant in addition to carrying on his specific responsibilities for heading up the Institute's expanded program of research and education in the Northeast. His territory will include New York, Pennsylvania, New Jersey, Maryland, Delaware, the New England States, and possibly West Virginia.

Dr. Garman will give particular attention to Pennsylvania, Maryland, Delaware and possibly West Virginia in addition to his overall responsibilities. It is contemplated that a field supervisor will be secured to assist Dr. Garman in servicing New York, New Jersey and the New England States, and that he will be located in the New England area. Dr. Garman will be located in the Institute's offices at 1700 K Street, N. W., Wash., D. C.

•

V-C Earnings Dip

Net income of the Virginia-Carolina Chemical Corp., Richmond, Va., dipped to $846,380 in the fiscal year to last June 30, from $1,379,016 in fiscal 1956.

Sales, reversing the preceding year's trend rose slightly—from $70,195,211 to $70,524,467. Among the special charges incurred during fiscal 1957 and charged to earnings were provisions for anticipated losses in connection with the disposal of closed plants, inventory adjustments, and compensation of former officials. These charges totaled $1,783,395, before deduction of a $944,890 credit for Federal income taxes.

Last Feb. 7 the company reached an agreement with Joseph A. Howell, former president, ending a dispute involving his employment contract. The settlement, according to W. H. Wilson, president of V-C, was "substantially less than the contract amount."

At the company's annual meeting Sept. 27, it was disclosed that the agreement reached with Mr. Howell provided for payment to him, his widow, or his estate of $20,000 a year for fifteen years.

Du Pont Nitrogen Sales Rep.

Carroll E. Walls, a specialist in agriculture, has been assigned as sales representative for Du Pont nitrogen products in Alabama, Mississippi, and Georgia, with headquarters in Atlanta. The appointment is effective October 1.

Mr. Walls will handle sales of "Uramon" ammonia liquors, "NuGreen" fertilizer compound, "Uramite" fertilizer compound, and "Two-Sixty-Two" feed compound, to the fertilizer and feed industries.

A native of Coy, Arkansas, Mr. Walls, received both bachelor's and master's degrees in agriculture from the University of Arkansas. He joined the Du Pont Polychemicals Department in 1956.

•

Eastern ESA Meeting Nov. 25

The Eastern Branch Meeting of the Entomological Society of America will be held at the Commodore Hotel in New York City on November 25 and 26. A highlight of the program will be a discussion of the Elements of Entomology. Four leading entomologists will speak on four aspects of this subject. Other speakers will discuss the problems involved in mass control of insects.

"Garden Gadgets" will be the subject of an informal discussion to be held the evening of November 25. In addition to the above program, papers submitted by the members of the society will be presented at the meeting.

Dr. E. H. Smith, New York State Agricultural Experiment Station, Geneva, New York, is chairman of the program committee. C. C. Alexander, Geigy Agricultural Chemicals, Ardsley, New York, is chairman of the Eastern Branch of the Entomological Society of America.

•

Shell Nematode Meeting

Fourteen midwestern agricultural scientists will meet in St. Louis October 9 and 10 to discuss damage due to the nematode and its control.

The meeting is open to farmers, nurserymen, county agents, extension service personnel, and others interested in agriculture. J. H. Hawke, St. Louis district manager of agricultural chemicals for Shell Chemical Corporation, said nematodes have been known for many years as appallingly destructive foes of vegetables, citrus, cotton, tobacco and nursery stock in the South, East and Gulf Coast areas. Recent studies show they also attack midwestern vegetables, melons, cotton and nursery stock, he said.

The 14 scientists will hold a workshop, sponsored by Shell Chemical Corporation.

•

Hercules To Produce Urea

The Hercules Powder Co., Wilmington, Del., has started construction of facilities to produce 10,000 tons per year of urea at its Hercules, Calif., plant. Anhydrous ammonia and carbon dioxide currently are produced at the plant.

Completion of the urea facilities is expected by late 1958.

•

NSS Again Holds Cotton Conf.

The trend toward serving not only more but richer food to the cotton plant is intensifying the problem of fertilizer placement for the grower.

The problem will be explored at the Beltwide Cotton Mechanization Conference in Shreveport, La. October 2-4 by Dr. G. E. Smith of the University of Missouri. He will speak on forms and placement of fertilizers for low-cost cotton production.

In recent years there has been a trend toward use of higher analysis fertilizers and higher rates of application. Cotton yields are being cut on many fields by improper placement of these materials, according to scientists. Also needed is more simple application equipment.

This subject, as it relates to spraying and dusting equipment, will be discussed by Kenneth Messenger of the U. S. Department of Agriculture, Beltsville, Md., under the topic "future application equipment for agricultural chemicals." The rapid appearance of new chemicals in various forms has complicated the design of application equipment.

The conference is sponsored by the National Cotton Council in cooperation with Louisiana State University and other land-grant colleges in the Cotton Belt, farm equipment industry, U. S. Department of Agriculture, and farm organizations.

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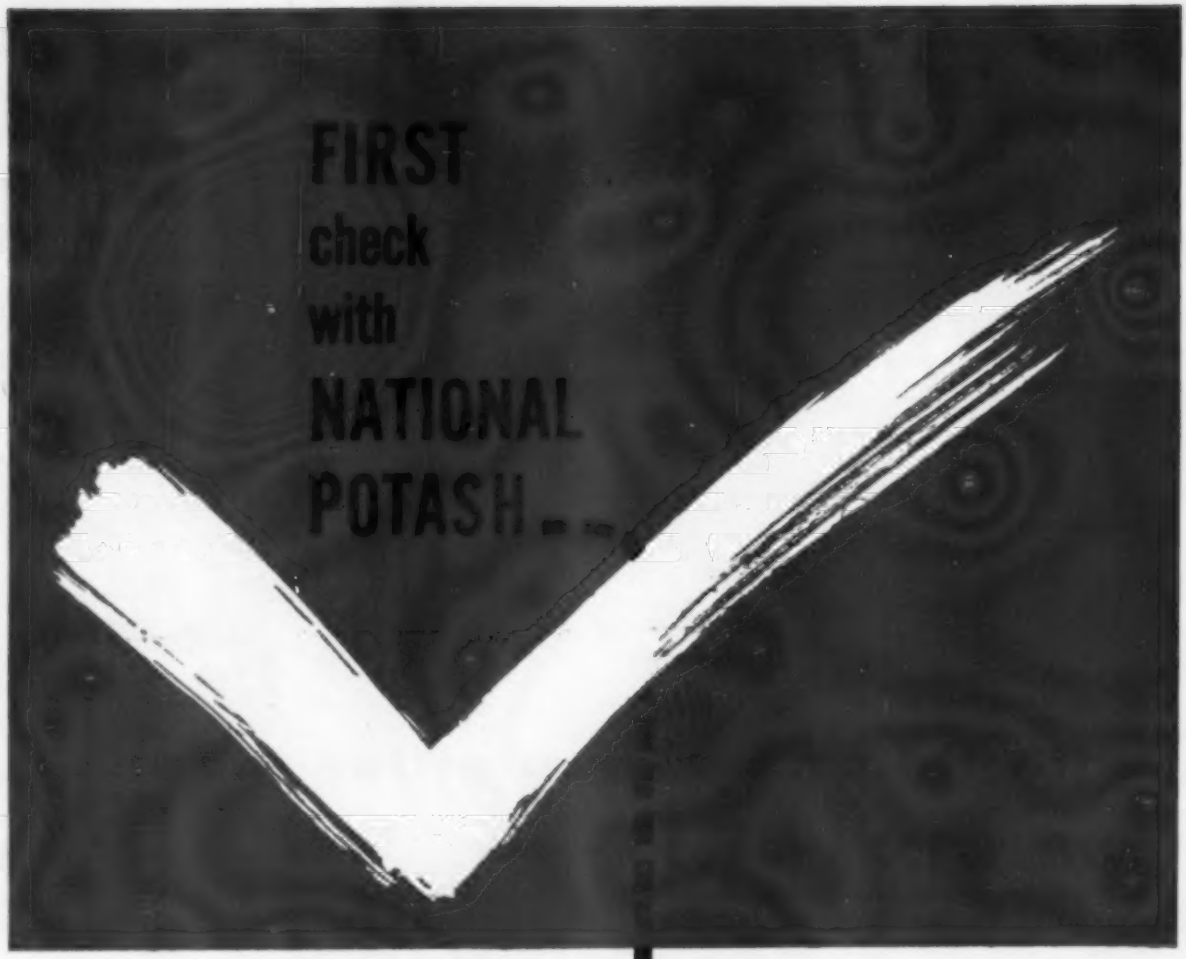

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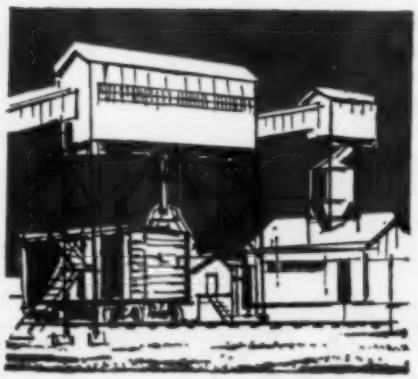

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Karabatsos Joins Velsicol

Velsicol Chemical Corp., Chicago, announced the appointment of Mr. Kimon T. Karabatsos as director of government relations.

Kimon T. Karabatsos

For the past two years, Mr. Karabatsos was director of legislative and special services for the National Agricultural Chemicals Association. Prior to joining the staff of NAC, he was administrative assistant to Rep. A. L. Miller of Nebraska, author of the Miller Pesticide Residue Amendment.

As director of government relations for Velsicol, Mr. Karabatsos will headquarter in Washington, D.C.

•

Keller Joins N. C. Station

Dr. Kenneth R. Keller has been named assistant director in charge of tobacco research for the Agricultural Experiment Station, N. C. State College, Raleigh.

He replaces Dr. W. E. Colwell, who resigned last March. Since 1954, Dr. Keller had been at the Agricultural Research Center at Beltsville, Md.

•

N.E. Weed Meeting Jan. 8-10

The Northeastern Weed Control Conference will be held January 8-10, 1958 at the Hotel New Yorker, New York City. This will be the twelfth annual meeting of the group. Program details will be announced later, according to L. Gordon Utter, chairman of the public relations committee.

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AAFCO Program Set for Oct. 18

The eleventh annual convention of the Association of American Fertilizer Control Officials to be held October 18th, 1957 at the Shoreham Hotel, Washington, D. C., will include reports on plant hormones and growth stimulants, by Dr. P. C. Marth, USDA; comments on advertising and sale of fertilizer by Commissioner S. Anderson, FTC; review of the commercial aspects of minor elements in fertilizer by R. P. Thomas, IMCC. The annual report of investigating committees will complete the program of the meeting.

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Am. Ag. Buys Buhner Co.

The American Agricultural Chemical Co., New York, has contracted to purchase the physical assets of the Buhner Fertilizer Co. of Seymour, Ind., and Danville, Ill. While terms of the transaction were not divulged, it is expected that the deal will be consummated sometime this month.

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Sulphur Prices Down

Texas Gulf Sulphur Company announced last month that it had notified all of its customers in the United States and Canada of a decrease of $3 per gross ton in the sales price of bright (top grade) sulphur, and $2.50 per gross ton for dark sulphur, effective immediately.

The new prices will be: $23.50 per gross ton for bright sulphur, FOB cars mine, and $23 for dark sulphur, FOB cars mine.

General competitive conditions were given as the reason for the change, according to the company.

•

Ewing Hercules Advisor

K. P. Ewing, who retired last month from the United States Department of Agriculture, has been named to an advisory post with Hercules Powder Company's Agricultural Chemicals Division.

Mr. Ewing's career in cotton insect control includes assignments at experimental stations in Texas and Louisiana since 1920.

After pioneering the early season cotton insect control program in Texas in the late 1940's, Mr. Ewing was made head of the Cotton Insects Section of the United States Department of Agriculture in 1953, the post he held until his recent retirement.

While most of Mr. Ewing's efforts will be devoted to consulting with the Hercules entomological staff, he also expects to be able to devote some time to working with farm groups interested in cotton insect control.

Miners Review Fertilizers

A program of some sixty technological papers is being developed for the Southeastern States Mining Conference and the first annual meeting of the Society of Mining Engineers of the American Institute of Mining, Metallurgical, and Petroleum Engineers, to be held in Tampa, Fla., Oct. 15-18, 1957.

Technical sessions, running through the first two days of the meeting, will be held in the Hillsboro and Tampa Terrace Hotels.

Two days have been scheduled for field trips. Visits will be made to Noralyn Mine and flotation plant of International Minerals and Chemical Corp.; triple superphosphate plant of Davison Chemical Co., American Agricultural Chemical Company's phosphorus furnace operation, Lehigh Portland Cement plant in Bunnell and, at Brooksville, the Diamond Hill Mine of Florida Rock Products, Inc.

Among the list of reports on the three day program are the following:

"Some Recent Developments in the Use of Ammonium Nitrate as an Explosive," by D. F. Tikker, Monsanto Chemical Co.

"Phosphate Deposits of the Eastern United States," by J. B. Cathcart, U.S. Geological Survey.

"Pelletizing Phosphate Rock," by R. E. Snow, International Minerals and Chemical Corp.

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Ehrsam Advances Yancey

R. K. Yancey was named general sales manager of the J. B. Ehrsam & Sons Mfg. Co., Enterprise, Kansas. The company, with sales offices in Atlanta, Georgia; Denver, Colorado; and Kansas City, Kansas; manufactures complete grain elevators and feed mills; and fertilizer manufacturing machinery, among other industrial equipment.

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Chemical Insecticide Moves

Chemical Insecticide Corp., announces it has moved its executive and sales offices to 30 Whitman Avenue, Metuchen, N. J. The new telephone number is Liberty 9-2300. The change is effective September 5th.

Fluid Energy Renames Equipment Lines

N. Stephanoff

F. E. Albus

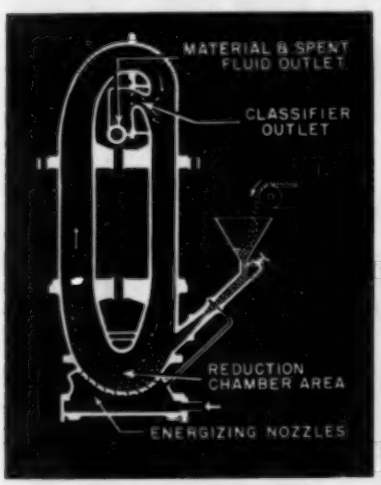
J. P. McKenna

The Fluid Energy Processing & Equipment Co., Philadelphia, announces that their patented grinding mills and collectors, formerly known as the Wheeler-Stephanoff mills and collectors, will henceforth be referred to as Jet-O-Mizer Mills and Jet-O Clone collectors. These mills grind a wide variety of products from waxes to abrasives to micron and sub-micron sizes continuously using fluid energy air or steam.

Nichols N. Stephanoff, president of FEPC, is responsible for the research and development of processing techniques and engineering design of the mills and also complete milling systems.

Mr. Frank E. Albus, vice president of Fluid Energy Processing & Equipment Co., has been associated with Mr. Stephanoff since 1951 and aids him in the above work, as well as directing the sales program and plant management of the company.

Mr. J. P. McKenna has lately joined Fluid Energy Processing & Equipment Co. His wide experience in the design, construction and operation of agricultural chemical plants in the United States and Latin America, will be utilized in developing better liaison with the industry in sales and service of the company's equipment, custom formulation, testing of new products, and also the design of formulating plants and all allied processing systems.



IMCC Sales, Earnings Up

International Minerals & Chemical Corporation last month reported record sales and a 29 per cent increase in net earnings after taxes for the fiscal year ended June 30, 1957.

International's annual report, listed earnings for the year at $6,961,000 or $2.81 per share on the 2,337,287 common shares outstanding, compared with $5,402,000 or $2.14 per share a year ago. Sales, totaling $106,189,000, were up 10 per cent over the $96,627,000 total for 1956.

$2,000,000 made WARFARIN a best-seller!

And the business-building promotion continues with 50 million ads in 37 farm papers during the next 8 months to keep Warfarin sold to the consumer as the *world's greatest rat and mouse killer!*

After nine years, pest control operators, farmers and other users know that Warfarin is the first completely effective rodenticide. Rats and mice die slowly *but surely* of internal hemorrhage. There's no tolerance, no bait-shyness. And Warfarin is safe. Approved for use in food establishments.

After nine years, too, dealers and formulators know that Warfarin is profitable. A first-rate product, well-promoted and cleanly merchandised at fair price levels.

Developed by the Wisconsin Alumni Research Foundation, Warfarin is available from Penick under our brand-name, Dethmor. Prompt shipments from stocks at Lyndhurst, N. J., Chicago, San Francisco and Portland, Ore.

DETHMOR® Warfarin

"The World's Most Wanted Killers"

Dethmor® Warfarin • Pro-Noxfish® • Sulfoxide®

Agricultural Chemical and Insecticide Division

S. B. PENICK & COMPANY 50 CHURCH ST., NEW YORK 8

PENICK

735 W. DIVISION ST., CHICAGO 10

Chemical Sales Clinic

Chemical salesmen will be told "How to get that order by three vice-presidents of three of the nation's leading chemical companies during the sixth annual Sales Clinic of the Salesmen's Association of the American Chemical Industry (SAACI).

The all-day clinic is being held beginning at 10:00 a.m. Monday, Oct. 14, at the Hotel Roosevelt, New York. It features morning and afternoon sessions. Individual presentations and the panel on getting orders will highlight the morning session. Three panel discussions are scheduled for the afternoon portion of the program.

Morning panelists include E.E. Fogle, vice-president of sales, Union Carbide Chemicals Co., division of Union Carbide Corp., New York; R. W. Hooker. senior vice-president of Hooker Electrochemical Co., Niagara Falls, N.Y., and William H. McConnell, vice-president of sales, Diamond Alkali Co., Cleveland.

Other morning session speakers and their subjects include Edward M. Krech, director of purchases of J. M. Huber Co., Brooklyn, "A Purchasing Agent Looks at Salesmen"; Paul Mills and Bernard Roberts of Sales Power, Inc., New York, "How to Communicate Your Ideas Effectively", and Elmer Schumacher, retired general manager of sales of the Polychemicals Department of E. I. du Pont de Nemours & Co., Wilmington, Del., "Selection and Training of Salesmen".

General John E. Hull, president of the Manufacturing Chemists Association, Washington, D.C., will be the luncheon speaker.

Three concurrent panel discussions are scheduled for the afternoon session. Panel No. 1 will cover "Personal Development and Evaluation of Salesmen"; Panel No. 2 is on "Measuring and Reporting Territory Potential", and "What Does a Salesman Expect from and Contribute to a Sales Meeting" is the subject of Panel No. 3.

California Forum Fall Meet

The fall meeting of the Central California Agricultural Forum was held in Bakersfield Calif., Sept. 11 and featured discussions of new defoliants and miticides.

Dr. Lewis Goyette of the research department, Virginia-Carolina Chem. Corp., Richmond, told of the new defoliant Folex, and O. B. Hitchcock, regional sales manager for Chemagro Corp., New York, talked on DEF, a new cotton defoliant.

Bob Counts, agronomist and defoliation specialist of the University of California's Shafter Station, followed with a discussion of defoliants and adjuvants.

Old and new miticides, in relation to spider mite resistance and integrated control, were discussed by Dr. H. T. Reynolds of the University of California, Riverside, and Gordon L. Smith, Shafter Experiment Station, U. of California, talked about field and laboratory techniques for mite identification on cotton.

Spencer Hikes Prices

The Spencer Chemical Co., Kansas City, Mo., has announced a $2 per ton price increase in fertilizer grade ammonium nitrate effective Oct. 1, 1957, and a $4 per ton increase effective Jan. 1, 1958.

The new prices replace the price schedule of May 28, 1957. The price differential between October and January follows the standard industry pattern of seasonal discounts.

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C-VPFA Lists Program

A tentative program has been announced by the Carolinas-Virginia Pesticide Formulators Assn. for their meeting at the Carolina Hotel in Pinehurst, N. C., on Nov. 18, 19, and 20.

The program starts on the afternoon of Monday, the 18th, and consists of a directors' meeting and a reception. Committee meetings are planned for Monday evening.

Speakers for the open meeting Tuesday are: Dr. Henry Gray, The Dow Chemical Co., "Present and New Chemicals in Agriculture"; and Dr. Herbert L. Haller, Agricultural Research Service, USDA, Washington, D. C., "Pesticides—Their Formulation and Use."

Also, Dr. Don Ellis, head of the Plant Pathology Dept., N. C. State College, Raleigh, "New Fungicides and the Future." Dr. Walter Mistric, Cotton Insect Research, N. C. State College, will talk on "Cotton Insecticides and the Boll Weevil in N. C."

Rodney C. Berry, director and state chemist, Dept. of Agriculture and Immigration, Division of Chemistry and Foods, Richmond, Va., will discuss the desirability of regulatory laws.

The annual banquet is scheduled for Tuesday night and will follow the election of officers that afternoon. Joseph E. Burger will be the guest speaker and his topic is "How to Get Better."

Lea Hitchner, executive secretary of the National Agricultural Chemicals Association, Washington, D. C., will be the featured speaker Wednesday. A round table discussion will follow and the meeting will close with the introduction of the new officers. J. M. Maxwell, Maxwell Insecticide Co., Cary, N. C., is the current president of the group.

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Pennsalt Plant In Canada

The Pennsalt Chemicals Corp., Philadelphia, has selected a ten-acre area near Oakville, Ontario, as the site of its first plant in Canada. The new unit will be a component of Pennsalt Chemicals of Canada, Ltd., a wholly-owned subsidiary.

William B. Billingsley, formerly associated with Canadian Industries, Ltd., and director of company sales in eastern Canada since 1954, has been named vice president and resident manager of Pennsalt Chemicals of Canada. Albert H. Clem, general manager of Pennsalt's Chemical Specialties Division, will serve as vice president and general manager.

•

Dow Increase 2,4-D Prices

Price increases were placed in effect October 1 on all 2,4-D weed killer formulations, W. W. Allen, agricultural chemicals sales manager for Dow Chemical Company, reports. The price change will amount to about eight per cent on the various 2,4-D products, he says.

The move is being made to compensate for increased steel costs in containers, higher freight rates and increases in general operating costs.

Prices of 2,4-D formulations which the farmer buys have followed a marked downward trend in price during the past half dozen years. With the present slight increase, prices will still be far below those of 1951.

•

NJCFA Elects New Officers

The National Joint Committee on Fertilizer Application elected three new officers at the group's annual meeting in Palo Alto, Calif., Aug. 26.

Elected were: (left to right) Dr. W. H. Garman of the National Plant Food Institute, secretary; Dr. Oscar A. Lorenz, University of California, chairman; and Dr. B. A. Krantz, University of California, vice chairman.

Vernon S. Gornto Retires

Vernon S. Gornto, popularly known in fertilizer circles as "Mr. Safety," retired July 31 from the Smith-Douglass Co. under provisions of the company's retirement plan. He was safety director, director of fire prevention and manager of the insurance department for Smith-Douglass.

Mr. Gornto was active in national safety circles, having been a charter member and later national chairman of the fertilizer industry safety group. He worked steadfastly for many years in the National Safety Council to achieve the sectional status the fertilizer industry now enjoys. A charter member of the fertilizer section of the Virginia Safety Association, he also organized and served as general chairman of the fertilizer section in both North and South Carolina. In 1953 he organized the fertilizer section of the Southern Safety Conference and served 2 years as general chairman of that group.

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Am. Ag. To Buy Buhner Co.

The American Agricultural Chemical Co., New York, has contracted to purchase the physical assets of the Buhner Fertilizer Co., Inc., of Seymour, Ind., and Danville, Ill.

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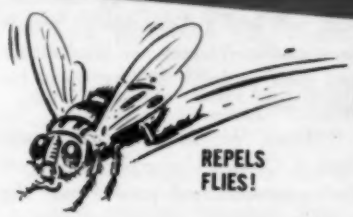
Chemagro Research Moves

The sections of the Chemagro Research Department which were formerly located in Pittsburgh, Pa., have been moved to Kansas City, Mo. These include the analytical, formulation, and product development sections and the research library.

Chemagro's director of research and the field research station are still located in New York.

BASIC INGREDIENT OF BETTER FLY SPRAYS



CRAG
BRAND

FLY REPELLENT

CRAG Fly Repellent has an effective two-way action different from any other fly spray ingredient:

1 **The powerful repelling action of CRAG Fly Repellent keeps biting flies, gnats and mosquitoes away from livestock on pasture. In some oil spray formulations, it often repels these insects for three to four days.**

2 **CRAG Fly Repellent extends the killing power of residual toxicants and synergizes pyrethrins in the spray formulation. Thus, it makes the insecticide more effective—helps kill flies when they return.**

The exclusive two-way action of CRAG Fly Repellent makes it possible for you to formulate a more effective fly spray at little or no extra cost because you use less toxicant in your formulation. The net result is a spray that offers better overall protection against flies... more profits for you and farmers. For seven years thousands of farmers have successfully used livestock and dairy sprays containing CRAG Fly Repellent. It is recommended by agricultural experiment stations in most leading dairy states. More livestock and dairy sprays contain CRAG Fly Repellent than any other repellent. It will pay you to investigate the many advantages of CRAG Fly Repellent.

CRAG AGRICULTURAL CHEMICALS ARE PRODUCTS OF

Union Carbide Chemicals Company

DIVISION OF UNION CARBIDE CORPORATION

30 East 42nd Street • New York 17, N. Y.

"Crag" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

MAIL THIS COUPON NOW

CRAG Agricultural Chemicals
UNION CARBIDE CHEMICALS COMPANY
Division of Union Carbide Corporation
180 S. Broadway, White Plains, N. Y.

Please send me full information on the formulation of fly sprays with CRAG Fly Repellent.

COMPANY _____

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ADDRESS _____

CITY _____ STATE _____

Symposium on Ag Future

"The Role of Agriculture in Future Society" will be the theme of a 75th anniversary symposium at Cornell's New York State Experiment Station on October 4th. Governor Averell Harriman will address the assembly and will break ground for a modern food science building and pilot plant.

Willard F. Libby, scientist member of the Atomic Energy Commission, will lead a discussion on trends in scientific research in agriculture and their probable impact upon future society.

Dean W. Malott, sixth president of Cornell University, will open the symposium and preside over the morning session, which will include Governor Harriman's address.

The role of ionizing radiations in the future preservation of food will be discussed by Bruce H. Morgan, U. S. Quartermaster Food and Container Institute of the Armed Services in Chicago. Since 1953, Doctor Morgan has been in charge of a broad research program on preserving food by irradiation.

"The Future of Agriculture and the Industrialization of Photosynthesis" will be the subject of an address by Doctor Richard L. Meier of the Mental Health Research Institute, University of Michigan. Doctor Willard F. Libby of the AEC will speak on "Atomic Energy in Agriculture." The vice president in charge of research for Swift and Company, Doctor Roy C. Newton, will discuss "Food Processing and the Future of Agriculture." The place of publicly supported scientific research in agriculture in future society will be the theme of an address by Doctor Byron T. Shaw, U. S. Department of Agriculture.

The New York State Experiment Station is engaged primarily in research in the field of horticulture and related sciences, with special reference to the utilization and processing of fruits and vegetables. Observance of the Station's 75th anniversary has continued throughout the year with meetings of agricultural groups. The symposium on October 4th will be the culminating event of the year.

Industry Meeting Calendar

Oct. 2-4—Beltwide Cotton Mechanization Conference, Shreveport, La.

Oct. 3-5 — Pacific Northwest Plant Food Assn., Sun Valley, Idaho.

Oct. 4—New York State Agricultural Experiment Station, 75th Anniversary, Cornell University, Ithaca, N. Y.

Oct. 7-8 — Western Agricultural Chemicals Assn., Villa Hotel, San Mateo, Calif.

Oct. 9-11—Florida Fruit and Vegetable Association, 14th Annual Convention, Hotel Fontainebleau, Miami Beach, Fla.

Oct. 14-16—Association of Official Agricultural Chemists, Annual meeting, Shoreham Hotel, Washington, D. .C.

Oct. 15-17—Association of American Food Control Officials, Annual meeting, Shoreham Hotel, Washington, D. C.

Oct. 17-18—Assn. of American Fertilizer Control Officials, Shoreham Hotel, Washington, D. C.

Oct. 18-19—Association of American Pesticide Control Officials, Shoreham Hotel, Washington, D. C.

Nov. 20-21—Ohio Pesticide Institute, Neal House, Columbus, O.

Oct. 21-24—National Pest Control Association, Brown Hotel, Louisville, Ky.

Oct. 29—Aerial Dusting & Spraying Conference, Davenport Hotel, Spokane, Wash.

Oct. 29-31 — Entomological Society of Canada, and Entomological Society of Alberta, Lethbridge, Alta., Canada.

Oct. 31—Middle West Soil Improvement Committee, Sherman Hotel, Chicago.

Oct. 31 - Nov. 1—Southeastern Fertilizer Conference and Southern Soil Fertility Conference, Dinkler-Plaza Hotel, Atlanta, Ga.

Nov. 3-5—California Fertilizer Association, St. Francis Hotel, San Francisco, Calif.

Nov. 6-8—Fertilizer Industry Round Table, Sheraton Park Hotel, at Washington, D. C.

Nov. 17-19—National Fertilizer Solutions Assn., Netherland - Hilton Hotel, Cincinnati, Ohio.

Nov. 18-20 — Carolinas - Virginia Pesticide Formulators Association, Carolina Hotel, Pinehurst, N. C.

Nov. 21 — Annual Fall Meeting, New Jersey Entomological Club, New Brunswick, N. J.

Nov. 25—Eastern Branch ESA, Commodore Hotel, New York, N. Y.

Dec. 2-5—Entomological Society of America. National meeting jointly with Cotton States ESA. Hotel Peabody, Memphis, Tenn.

Dec. 3-4—Iowa State College Fertilizer Manufacturers' Conference and Fertilizer Dealers' Short Course, Ames, Iowa.

Dec. 9-12 — Chemical Specialties Manufacturers Association, Hollywood Beach Hotel, Hollywood, Fla.

Dec. 9-12—Vegetable Growers Association of America, Jung Hotel, New Orleans.

Dec. 10-12 — North Central Weed Control Conference, Hotel Savory, Des Moines, Iowa.

Dec. 11-13—Agricultural Ammonia Institute, Hotel Marion, Little Rock, Ark.

Dec. 12-13—Beltwide Production Conference, including the Cotton Insect Control Conference, Peabody Hotel, Memphis, Tenn.

Dec. 12-13—Cotton Insect Control Conference, Peabody Hotel, Memphis, Tenn.

Dec. 26—26th Exposition of Chemical Industries at the Coliseum in New York.

Jan. 4-5—1958 Texas Fertilizer Conference, Texas A&M, College Station, Texas.

Jan. 8-10—Northeastern Weed Control Conference, Hotel New Yorker, N.Y.C.

Jan. 13-15—1958 Weed Society of America and Southern Weed Conference, Peabody Hotel, Memphis, Tenn.

Jan. 20-21—Alabama Association for Control of Economic Pests, State Coliseum, Montgomery, Ala.

Jan. 21-23 — 1958 California Weed Conference, San Jose, Calif.

H. Kingery J. F. Dulaney

Nitrogen Division Names 2

Harold Kingery and Jack F. Dulaney have been appointed district sales managers by Nitrogen Division, Allied Chemical & Dye Corp., New York.

Mr. Kingery was put in charge of the South-Central District, with headquarters in Memphis. He will direct sales operations for both fertilizer manufacturing materials sales direct application materials.

Mr. Dulaney will supervise fertilizer manufacturing materials sales in the Atlanta District, with headquarters in that city.

Mr. Kingery came with Nitrogen Division in 1953 as a field sales representative. Most recently he was sales supervisor for direct application materials in the South Point, Ohio, district.

Mr. Dulaney joined Nitrogen Division in 1950 as a technical service representative and had been southwest sales supervisor in the Memphis office.

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Cotton Mechanization Conf.

The 1957 Beltwide Cotton Mechanization Conference will be held in Shreveport, La., Oct. 2 to 4. R. Flake Shaw, executive vice president of the North Carolina Farm Bureau Federation, Greensboro, N. C., will be the general chairman of the conference.

The second day of the conference will be devoted to weed control. H. T. Barr, head of the department of agricultural engineering at Louisiana State University, will present an address entitled, "Where Do We Stand in Our Battle Against Weeds." Dr. Grady B. Crowe, Dr. John T. Holstun, Jr., and O. B. Wooten of the USDA Delta Branch Experiment Station, Stoneville, Miss., will discuss the costs of different weed control practices.

A farmer's experience with modern weed control will be described by Russell Y. Ratcliff of St. Joseph, La. Dr. W. C. Shaw of the USDA at Beltsville, Md., will discuss "What's Ahead in Weed Control?"

Future application equipment for agricultural chemicals will be discussed by Kenneth Messenger of the USDA Aircraft and Special Equipment Center, Beltsville, Md.

Following the morning talks, a tour will be conducted to the Red River Valley Experiment Station in Bossier City, La., where full season weed control practices will be demonstrated.

•

S. C. Plant Food Meeting

The South Carolina Plant Food Educational Society met in Clemson, S. C., for their eighth annual meeting on Sept. 25.

Dr. W. H. Garman of the National Plant Food Institute spoke at the meeting and told of the Institute's expanded fertilizer use purgram. J. T. McAllister, conservation equipment engineer of Orangeburg, S. C., explained stubble mulch planting to the group and Robert H. Garrison, head of the seed certification department of Clemson College, told of small grain plantings.

The importance of fertilizer placement was emphasized by Dr. J. F. Reed, southern manager of the American Potash Institute, Atlanta, and B. D. Cloaninger, director of fertilizer inspection and analysis at Clemson College, led the group on a tour of fertilizer department facilities at the college.

•

Named Sales Director

Donald K. Ballman, general sales manager of the Dow Chemical Co., Midland, Mich., since 1949, has been named director of sales. He succeeds Donald Williams who recently was appointed director of corporate relations.

Simultaneously, William R. Dixon was named general sales manager.

Mr. Ballman joined the company in 1935 and was named assistant general sales manager ten years later.

Merck Names Two

J. J. Simmons has been transferred to the Sales Department of Merck and Co., Inc., Rahway, N.J., where he will be responsible for sales of Gibrel, Agri-Strep and other plant chemicals.

In another personnel change announced recently, J. W. Kennady has joined the Market Planning Department as Plant Products Manager. Mr. Kennady was associated with the U.S. Dept. of Agriculture for several years and held the position of Products Sales Manager for Agricultural Chemicals, Diamond Alkali Co., before accepting the Merck position.

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Merck Grants Research Aids

Merck & Co., Inc., of Rahway, N. J. has established more than 30 new grants-in-aid at leading agricultural research centers to speed up investigative work on gibberellic acid.

The program, which supplements the company's own research, consists of funds, technical material and commercial type formulations. Nearly 1000 scientists are engaged in various projects to broaden the present base of knowledge about the plant-growth stimulant.

Merck established the grants throughout the country because of variations in growing conditions and the need for specific knowledge upon which recognized agricultural scientists in the different states can base practical recommendations.

Merck is cooperating with grants-in-aid at the following universities and experiment stations:

California Institute of Technology, Clemson Agricultural College, Michigan State University, Missisippi State College, New York Agricultural Experiment Station (Geneva), New York State College of Agricultural (Cornell), Oregon State College, Rutgers University, Texas A & M, University of California (Davis and Riverside), University of California (Los Angeles), University of Florida, University of Illinois, University of Kentucky, University of Rhode Island, Washington State College.

Arcadian® News

Volume 2 | For Manufacturers of Mixed Fertilizers | Number 10

How to Save Money in AMMONIATION

New Ways to Cut Costs and Improve Output

More and more fertilizer manufacturers are producing better fertilizers at lower cost by initiating a few simple, inexpensive changes in their ammoniation methods, with the help of Nitrogen Division, Allied Chemical, Technical Service.

For example, proper selection of the correct nitrogen solution for the particular operation can effect substantial economies in many ways. A technical service man can help you choose the solution that fits your exact needs from the great variety of solutions developed and produced by Nitrogen Division.

Using the Nitrogen Division solution best adapted for specific fertilizer manufacturing programs can result in basic benefits.

1. *Lower cost per unit of nitrogen and other plant foods in the fertilizer.*
2. *Lower freight rates per pound of nitrogen in the more concentrated solutions.*
3. *Increased output of ammoniated superphosphate and mixed fertilizer in tons per hour from labor and equipment.*
4. *Fume reduction, resulting in reduced loss of nitrogen and better working conditions for labor.*
5. *Better physical condition of complete mixed fertilizers at lower production cost.*
6. *The use of more normal superphosphate and less triple superphosphate.*
7. *A low ratio of neutralizing ammonia to total nitrogen and less sulphuric acid requirement.*

Nitrogen Division, Allied Chemical, produces many different nitrogen solutions from which you can select those best suited to your ammoniation methods and equipment. It pays to use the right solution.

Nitrogen Division technical service men often suggest minor changes in equipment and operating methods to effect savings in ammoniation costs.

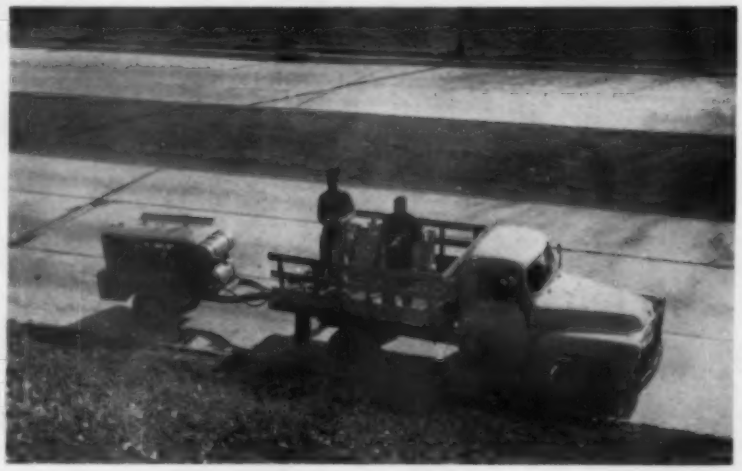
Simple adjustments, such as insulating pipelines and blowing back pipelines during non-operating hours in cold weather, have permitted the use of concentrated solutions winter and summer. This avoids expensive seasonal plant change-over and enables the manufacturer to use the same method of producing high-quality mixed goods throughout the year.

Efficient ammoniation involves proper technique, equipment and materials. Nitrogen Division offers a complete line of nitrogen solutions from which selections can be made adapted to particular conditions. Nitrogen Division technical service men are experts in ammoniation. They also have a thorough knowledge of the entire operation of a fertilizer plant. Their advice is free to customers.

Get the facts from your Nitrogen Division salesman . . . or contact Nitrogen Division, Allied Chemical, 40 Rector St., New York 6, N.Y. Phone: Hanover 2-7300.

Arcadian News for Fertilizer Manufacturers . . . . . from NITROGEN DIVISION

Illustration at right shows how new methods are speeding roadside fertilization. Two men with air blast guns and a compressor, in addition to a truck and driver, apply granular fertilizer to 8 to 10 acres of roadside per hour. This encourages growth of turf, shrubs and trees, beautifies the right of way, prevents erosion, saves costly repair bills.



TONNAGE OPPORTUNITIES

ROADSIDE FERTILIZATION

Grass along our highways is a growing market for fertilizer. You can make this market grow faster by telling your local highway departments and road contractors about the benefits of fertilizer. The status of fertilizer use along highways is about where farm crop fertilization in the corn belt was 15 years ago. The market is ripe for development.

Thousands of New Acres

Our vast new highway program is adding thousands of acres of grassed roadsides every month. Most highway departments specify fertilizer for establishing grass, trees and shrubs. More and more of them are also learning that maintenance fertilizer applied every other year keeps established sod strong enough to prevent costly erosion, in addition to beautifying the roadside.

We have 380,000 miles of primary highways today, most of which are bordered by grass. Add to this the 41,000 miles of expressways, authorized by the new Federal Interstate Highway program, and roadside fertilization becomes a big tonnage market. Construction of these new roads over the next 15 years will require an average of 35 acres per mile. About a million acres of this will be seeded to grass and fertilized with complete fertilizer. And this grass will also need maintenance fertilizer. On better soils, this may be straight nitrogen; on poorer soils, mixed fertilizer will be needed. All in all, it is estimated that maintenance fertilizer for highways will amount to 250,000 tons per year.

Turf along many old roads needs maintenance fertilizer badly. The aim is to keep the sod vigorous enough to hold water, to prevent washing and to keep down weed growth, without getting such rapid growth of grass that more frequent mowing is required.

Arid land roadsides, of course, will not be fertilized. Areas of heavy rainfall and leached soil are the best market. But this includes most of the eastern two-thirds of the country, plus parts of the Pacific Coast. The new highways, with broader rights-of-way, and with more grading to expose poor subsoil, will need more fertilizer than older roads that followed ground contours.

New Methods and Equipment

Not all highway authorities realize the benefits of roadside fertilization in saving other maintenance work. Many of them do not know how to fertilize high cutbanks and steep ditches. New machinery and new methods of spreading fertilizer make these jobs fast and easy.

Roadside fertilization is only about 20 years old. A recent national survey shows that only 8 out of 41 states reporting gave a flat yes to the question, "Do you recommend fertilizer for maintenance?" Many are experimenting with the idea. Some states are going into extensive fertilization of grass as fast as they try out new hydraulic and air-blasting equipment and find out how well it works. At least 28 states are regularly using fertilizer along parts of their roadsides and in special trouble areas. Nearly all states use fertilizer to establish turf.

Granular fertilizer is the most popular for roadside application. It is easy to dissolve in water for hydraulic applicators. It handles and spreads well in air-blast equipment, and creates less dust.

Most states report using ratios of 1-1-1, 1-2-1, 1-3-1, and straight nitrogen fertilizer. A few have been using liquid fertilizer applicators. In acid soil areas of the South and the Northeast, lime is used in establishing grass, but seldom for maintenance. With the hydraulic method of application for new seedings, used in 20 states, lime, fertilizer, seed and water can all be mixed together and blown onto the soil, either before or after mulching, or with a mulch. For maintenance applications, the air-blast method is gaining ground, since no water supply is needed. The air compressor is hauled by the truck carrying the spreader crew. Two or three men in a two-gun crew can fertilize up to 8 or 10 acres of roadside per hour, reaching high cutbanks as well as steep slopes. Sanding trucks and regular agricultural fertilizer equipment are poorly adapted to roadside fertilization.

Use of fertilizer by highway departments is handled by maintenance engineers, right-of-way engineers or landscape engineers. The job of establishing new turf is done by contractors working under state specifications. You can promote highway turf fertilization in your area by contacting these men.

Useful Information

The American Roadbuilders Association and the National Plant Food Institute Roadside Task Force have assembled useful information that can help you sell this market. For details, write to Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N. Y.

Arcadian News for Fertilizer Manufacturers . . . . . from NITROGEN DIVISION

Many soils need LIME to make fertilizers pay!

It will pay you to encourage farmers to test their soils regularly and apply lime or limestone as needed.

To make sure your fertilizers produce maximum results, it will pay you to encourage your farmer customers to test their soils and use lime (or limestone) as needed. Lime reduces soil acidity. Lime also increases the availability of phosphorus to crops.

Throughout the humid areas, most soils are acid enough to need lime. This includes all states east of a line extending from the Red River in Minnesota to central Texas.

Yet, the tonnage of lime (or limestone) used by farmers today is down from its post-war peak in 1947. In Missouri, for example, farmers now spread only 2 million tons of lime per year, where they once used 3½ million tons per year. Over the country, farmers now apply only a third of the 78 million tons a year needed to maintain soil fertility for high crop yields.

Lime supplies calcium as a plant food as well as a means of reducing soil acidity. But many acid soils, especially those that are fertilized, supply enough calcium plant food for most crops except legumes. The great increase in the use of mixed fertilizers containing superphosphate supplies considerable calcium to the soil. Much of this is in the form of gypsum, which also provides sulphur, but does not reduce soil acidity. Limestone or lime is often needed to reduce soil acidity.

When soil is too acid to grow good crops, farmers often blame the fertilizer used for not producing expected results. In acid soils, soil bacteria action is slowed down. This speeds leaching of fertilizers and slows down release of plant foods from organic matter.

But the biggest disadvantage of soil acidity is its effect in making phosphorus unavailable to crops. This cripples fertilizer's ability to produce profitable yields.

Acid Soil Fixes Phosphorus

Among the many forms of phosphorus fertilizer materials, normal superphosphate is high in availability. Some phosphates are more soluble. Others, like rock phosphate, are only slowly available under any conditions.

Agronomist Firman E. Bear points out that "if a soluble phosphate is applied to acid soil, it loses its solubility almost immediately."

In our typical acid soils the highly-soluble phosphates are soon fixed in the soil by iron and aluminum to form compounds from which crops can get little or no phosphorus plant food. Ammoniated superphosphate in mixed fertilizers, however, has the phosphorus tied to calcium, so it is less apt to be tied up with iron or aluminum.

Agronomist Louis Thompson of Iowa State College says, "Phosphorus combined with calcium is more soluble than if combined with iron or aluminum."

That is why fertilizers containing ammoniated superphosphate have an advantage over fertilizers containing more soluble phosphorus in soils having high fixation properties.

Agronomist C. E. Miller of Michigan State College points out, "when water-soluble phosphates are added to the soil, rapid fixation occurs. It is rather generally assumed that liming is a valuable practice in liberation of fixed phosphorus and in prolonging the availability of applied phosphates in acid soils."

Lime provides the calcium to reduce soil acidity, so that less soluble iron and aluminum are present in the soil solution to tie up phosphorus. Most forms of phosphorus perform best when acid soils are limed enough to reduce acidity to a pH of 6 to 7. Since leaching and crop use of calcium may take 250 or more pounds of calcium out of the soil every year, it pays farmers to have a regular program of liming at least once during a crop rotation.

Many field tests have shown that liming soil has improved crop returns on corn and grain as much as $4 to $5 per acre. In a 5-year Ohio test with a corn, wheat and hay rotation, investment of $1.35 in lime per year per acre produced extra crops worth $14.78 in a clover rotation and $23.03 in an alfalfa rotation.

Apply Lime Any Time

Spreading limestone with dealer trucks during off-days and slow seasons is a good way to help your fertilizers pay off for farmers. Legumes need lime in the surface soil at seeding time. But for other crops, lime can be applied at any time before or after plowing. Fall is a good season for liming stubble ground and pastures. Your fertilizer will show better profits on limed land. When you sell fertilizer—don't forget lime!

NITROGEN *plus* SERVICE

There are many reasons why it pays you to deal with Nitrogen Division, Allied Chemical. You are served by America's leading producer of the most complete line of nitrogen products. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions for the fertilizer industry. You are assured of dependable supplies from three huge plants at Hopewell, Ironton, and Omaha. Your nitrogen is delivered to you by the best transportation facilities and equipment. You get technical assistance and formulation advice from the largest and most efficient staff of nitrogen experts. Your sales are supported by the most powerful advertising campaign ever conducted to sell fertilizers. Nitrogen Division is your headquarters for NITROGEN *plus* SERVICE. Look over the big line and contact one of the 14 offices listed below.

Arcadian Nitrogen Solutions

	CHEMICAL COMPOSITION %					PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®								
2	41.0	22.2	65.0	—	12.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	1.147	18	26
3	41.0	26.3	55.5	—	18.2	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	1.188	1	56
4M	41.0	19.0	72.5	—	8.5	1.194	7	61
6	49.0	34.0	60.0	—	6.0	1.052	48	-52
7	45.0	25.3	69.2	—	5.5	1.134	22	1
URANA®								
10	44.4	24.5	56.0	10.0	9.5	1.108	22	-15
11	41.0	19.0	58.0	11.0	12.0	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	1.081	25	- 7
13	49.0	33.0	45.1	13.0	8.9	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	1.052	29	1
U-A-S®								
A	45.4	36.8	—	32.5	30.7	0.925	57	16
B	45.3	30.6	—	43.1	26.3	0.972	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	0.618	211	—

Other ARCADIAN® Nitrogen Products: UREA 45 • A-N-L® Nitrogen Fertilizer Ammonium Nitrate • American Nitrate of Soda • Sulphate of Ammonia

NITROGEN DIVISION Allied Chemical & Dye Corporation

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Omaha 7, Neb., P. O. Box 166	Bellevue 1464
Raleigh, N. C., 16 W. Martin St.	Temple 3-2801
Columbia 1, S. C., 1203 Gervais St.	Columbia 3-6676
Atlanta 3, Ga., 127 Peachtree St., N. E.	Jackson 2-7805
Memphis 9, Tenn., 1929-B South 3rd St.	Whitehall 8-2692
Columbia, Mo., P. O. Box 188	Gibson 2-4040
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Los Angeles 5, Cal., 2999 West 6th St.	Dunkirk 8-3201
San Francisco 4, Cal., 235 Montgomery St.	Yukon 2-6840

Tobacco Fertilizer Conf.

A conference to discuss possible new fertilizer ratios for Pennsylvania Filler tobacco was held at the Southeastern Field Research Laboratory, Landisville, Pa., on Aug. 27, and was attended by representatives of the U.S. Department of Agriculture, Pennsylvania State University, and the fertilizer industry.

J. H. Eaken, extension agronomist of the university, stated that as a result of the soil testing program, started by the agronomy department in 1952, they are running into difficulty in making fertilizer recommendations for certain tobacco fields in Lancaster County. Figures were presented showing that 13 per cent of tobacco fields tested in 1956 showed available potash from 300 to as high as 700 pounds per acre. Present recommendations call for the use of 800 to 1200 pounds of 4-8-12, or its equivalent, per acre plus eight to ten tons of manure. No tobacco fertilizer with a ratio other than 1-2-3 is now available to cut down on the potash added to such high-potash soils.

Dr. E. T. York of the American Potash Institute, raised the question of whether soil analyses give a true picture of the potash actually available to the tobacco plant. The USDA pointed out that all fertilizer research on tobacco, regardless of where grown, has shown the desirability of a heavy consumption of potash, not so much from a yield standpoint as from a quality standpoint. The department also stated that the 1-2-3 ratio has shown itself to be surprisingly effective in a wide diversity of tobacco areas and and types.

In the view of some observers at the conference, the tobacco plant would benefit most from having its potash supply available close at hand, that is to say, near the plant and in the upper three or four inches of soil. There is a great difference in the penetration power of the tobacco root system and that of corn, for instance.

The consensus of the conference was that it would be desirable to have potash analyses run on samples of leaf from high-potash and low-potash soils of Lancaster County, and also to set up a new experiment at the station to study the effects on leaf potash and quality of differential rates of potash applied in the fertilizer.

At the present time there is a rotation experiment under way at the station to compare effect of the sulfate form applied to tobacco only, with K as sulfate applied to all crops in a four-year rotation of corn, tobacco, wheat, and hay, or of corn, tobacco, and two years of sod. Another rotation experiment has been set up to compare the effect of an initial application of potash sufficient to satisfy the K-fixing power of the soil, with the standard application. The plots receiving the massive initial application will also receive the standard amount in this and subsequent years of the experiment.

•

DDT Plant For Egypt

The first DDT production plant in Egypt, built with help from the United Nations Childrens Fund (UNICEF) and the United Nations Technical Assistance Administration, was opened recently at Kafr-el-Zayat, 100 miles north of Cairo.

UNICEF contributed $250,000 for production equipment and the services of R. L. Vrinat (France), also Gatto (Italy), and J. G. A. Laper (Canada).

•

NPFI Grant To Purdue

The National Plant Food Institute has entered into an agreement with Purdue University to establish a research grant at the University's Agricultural Experiment Station with the Department of Agricultural Economics, "for the purpose of supporting a program of research covering the economics of fertilizer use in crop production with special emphasis on economic analysis of agronomic data."

The one year grant of $2,100 authorized by the Institute will permit the University personnel to assign qualified staff members to direct the graduate students and to supervise the project, including the necessary field, laboratory, and greenhouse facilities.

N. C. School, Jan. 21-22

The 1958 North Carolina Pesticide School will be held on January 21 and 22 at N. C. State College in the College Union Building, Raleigh, N. C.

The purpose of the school is to review the latest research findings and make pesticide recommendations for 1958.

The program, covering herbicides, fungicides, insecticides and application equipment, should be informative to such groups as dealers in pesticides, formulators, manufacturers, county agents, farm superintendents and vocational agriculture teachers.

•

USDA Seeks New Attractants

Natural and synthetic attractants to lure insects are being sought by research chemists and entomologists as modern weapons for more effective control of agricultural and other insect pests, the U. S. Department of Agriculture reports.

The effectiveness of three attractants has been demonstrated during the past year in the medfly and gypsy moth programs.

Chemists at USDA's Agricultural Research Center in Beltsville, Md., are searching for new compounds among hundreds of natural plant materials and organic synthetics. Several new and promising attractants are reported to have already been developed.

Most of the tests of new attractants are made at USDA entomological research stations where there is opportunity to try out the attractants on different insects under field conditions.

•

Aerial Dusting Conference

The Washington State Aeronautics Commission and the State College of Washington have announced that their annual Aerial Dusting and Spraying conference will be held on Oct. 29 at the Davenport Hotel in Spokane, Wash.

The annual convention of the Washington State Aviation Association will be held on Oct. 30, also at the Davenport.

Climax Research Program

A program totalling $25,000 in agricultural grants-in-aid at ten universities and two independent research foundations will be sponsored by the Climax Molybdenum Company during 1957-1958. Under this program, agricultural and biological research projects will be conducted on molybdenum as a trace element in an effort to compile additional data on its effect on plant life.

The new program will include field and laboratory work to be conducted by the following universities: University of California; Johns Hopkins University, University of Connecticut; University of Florida; University of Georgia; University of Hawaii; University of Michigan; Oregon State College; Rutgers University; and Washington State College. In addition, work will be conducted by the Southwest Agricultural Institute and the Texas Research Foundation, both independent research organizations.

•

Fertilizer Solutions Assn. Conv.

At the 1957 Annual Convention of the National Fertilizer Solutions Association, to be held at the Hotel Netherland-Hilton in Cincinnati, Ohio, November 17 to 19, 1957, a panel of experts from the Ohio State Universtiy, Columbus, Ohio, will discuss the subject Essentials to Success as applied to the Liquid Fertilizer Industry.

Dr. John K. Pfahl, Assistant Professor of Finance at the University, will talk on sales ethics. Another member of the panel is Dr. Gordon Ryder, whose subject will be agronomy.

Economics, the third phase of the panel discussion, will be presented by Dr. John W. Sharp, who is associate professor in Agricultural Economics in the College of Agriculture at Ohio State University.

This panel discussion has been programmed for the afternoon session, starting at 2:00 P. M. on Tuesday, November 19, 1957, and will be followed by a discussion on "Additives to Fertilizer Solutions." Presentations under this subject heading will include "Recent Developments of Insecticides and Herbicides;" "Chelate Applications;" and "Gibberellic Acid." Speakers on these subjects will be outstanding research men in the agricultural chemical development field.

Howard R. Lathrope, Agronomist for the Nitrogen Division, Allied Chemical & Dye Corporation, Indianapolis, Indiana, and other featured speakers will discuss Successful Educational Meetings, beamed primarily at the dealer level of the industry, and will cover the essential details of how to call and hold a successful meeting. Mr. Lathrope is widely known in the field as an enthusiastic and inspiring speaker on this general subject.

•

Forest Fertilization Test

Rayonier, Inc., New York, a chemical cellulose producer, is conducting what is thought to be the country's first large scale forest fertilization program for comparing responses to several plant food carriers and rates of application.

Dr. T. E. Maki, professor of forest management at North Carolina State College, is supervising the experiment, conducted by Rayonier's Southeast Timber division in cooperation with the Nitrogen Division of Allied Chemical & Dye Corp. The experiment is being conducted in a pulpwood plantation of eight year old slash pines on Rayonier property near Sanderson, Fla.

•

Cyanamid Names Six

The American Cyanamid Co., New York, has announced the appointments of three general managers and three assistant general managers.

Henry C. Little has been named manager of the newly-formed General Services division, Clifford D. Siverd heads the Farm and Home division, and Thomas P. Forbath is manager of the Engineering and Construction division.

Named assistant general managers were: Raymond M. Nee, Engineering and Construction division; Dr. Jack T. Thurston, Phosphates and Nitrogen division; and John W. King, General Services division.

Director Of Modesto Lab.

K. E. Marple, manager of Shell Development Co.'s Denver Agricultural Research Laboratory, has been named director of the Agricultural Research Division. The division's laboratories at Denver and Modesto, Calif. are being consolidated in new facilities now under construction at Modesto. He will assume his new duties there on November 15.

Mr. Marple replaces S. H. McAllister who has been appointed manager of Shell Chemical Corporation's Agricultural Chemical Sales Division, New York.

T. R. Hansberry, manager of the Modesto Laboratory, has been named assistant director of the division and will be in direct charge of the biological sciences.

•

Chile Plans Chemical Plant

The Chilean Government Corporacion de Fomento de la Producion (CORFO) has asked for bids for constructing and equipping a small plant designed to produce insecticides, herbicides, detergents, solvents, salicylic acid, aspirin, and plastics from by-products of other industries which CORFO has participated in developing, such as the oil refinery at Concon and the steel mill at Huachipato.

•

Cyanamid Appoints Raymaley

Francis A. Raymaley has been appointed to the newly-created position of grasslands specialist for the American Cyanamid Co., New York. His services will be available through the United States, according to the company, but his chief interests will be in the area north and east of Illinois and Kentucky, as well as in eastern Canada.

Mr. Raymaley was formerly senior agricultural advisor to Seabrook Farms Co., Seabrook, N. J., and had previously spent fifteen years with the N. J. Agri. Ext. Service.

Mr. M. V. Bailey, technical director for the Phosphates and Nitrogen Division of American Cyanamid, said that Cyanamid's objective in establishing the new post was to "provide a highly trained specialist to cooperate with colleges, agricultural experiment stations, extension services and commercial organizations in the promotion of new methods of grassland management."

ACP Holds Convention

The American Chemical Paint Co., Ambler, Pa., held a meeting of delegates from 34 nations, representatives from the USDA, the land grant colleges, industry and the universities, on September 23-26. Sessions on agricultural chemicals included reports by: Dr. W. Ennis, USDA, on new developments in weed control; Aminotriazole for control of Canada thistle by O. Lee, Purdue Univ.; Introducing herbicides, by S. Fertig, Cornell Univ.; Research with phenoxy compounds by W. Shaw, USDA; Rodenticides, W. Dykstra, U. S. Dept. of Interior Fish and Wildlife;

ACP research investigators, R. H. Beatty (director), J. R. Sterry, R. Fosse, A. J. Tafuro, J. Gallagher, R. Hart, and others, presented reports on use of aminotriazole, brush control, water weed control, weed control in sugar cane, cereals, ACP for lawns and home gardens, herbicides in corn, etc.

The agricultural delegates toured the ACP experimental farm and the Horticultural Crops Research Branch of USDA at Beltsville, Md.

Among the American Chemical Paint Company officials addressing the meeting were: Leon Cherksey, chairman of the board; Gerald C. Romig, president; J. J. Shellenberger, vice president and director of marketing; F. P. Spruance, vice president; A. Douty, director of research; and R. H. Beatty, director of agricultural research.

•

Ohio Pesticide School Nov. 20

The annual winter meeting of the Ohio Pesticide Institute will be held at the Neil House in Columbus Ohio, November 20-21. J. D. Wilson, secretary, advises that program details will be announced later.

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New Nott Products

Two new products are being produced by the Nott Manufacturing Co. of Mount Vernon, N. Y. One is "Chick-Not," a chickweed herbicide; the other is Nott's "Bulb-Saver," a three-way combination fungicide, insecticide, and repellent.

•

Fertilizer Plant In Arkansas

A new liquid fertilizer plant is being built at Patterson, Ark., for the Farmer Granary. The plant, which will have a capacity of five tons in 15 minutes, will be equipped with a soil testing laboratory and mechanically controlled mixing devices.

EDITORIAL

(*From Page 27*)

On the basis of figures thoroughly familiar to everyone in the fertilizer industry it should be self-liquidating, and as a matter of fact should earn substantial profit, making it possible to enlarge the base of the program from year to year. A high percentage of the participants should be converted into cash fertilizer buyers each year, and think of the wonderful opportunities for intelligent fertilizer sales propaganda based on the test results.

WHEN ONE-HALF OF THE BOXCAR IS EMPTY... THE TL-6 TURNS AROUND INSIDE THE CAR AND UNLOADS THE OTHER HALF

Compact TL-6 TRACTOLOADER® keeps material moving for CHENOA MILLING COMPANY, Chenoa, Illinois

Since there isn't a ramp at Chenoa Milling Company's warehouse (due to railroad restrictions), the TL-6 enters the boxcar containing grain about 200 yards away — where there is a ramp. Car is then moved to warehouse. Here a makeshift bin is fed by the TL-6 and the grain moves into the warehouse on a conveyor. The boxcar stays at the warehouse until it's completely unloaded — no need to move it back to the ramp when half unloaded. The TL-6, with its compact design and short turning radius, easily maneuvers around inside the car to finish its job.

Why not let this ½-yd loader solve your confined-area material handling problems? Get an on-the-job demonstration from your Allis-Chalmers construction machinery dealer.

TRACTO — *a sure sign of modern design*

TL-6 QUICKLY HANDLES OTHER JOBS FOR CHENOA MILLING, TOO!

CARRIES FERTILIZER FROM BOXCAR INTO STORAGE SHED — no losing the load, either, with tip-back bucket. Makes complete cycle without shifting — operator just pushes or pulls a lever to go forward or reverse.

DELIVERS FERTILIZER TO CUSTOMER'S TRUCK — a full bucket every time. TL-6 gets load without ramming with smooth crowding action of hydraulic torque converter drive.

LOADS HOPPER WHEN MIXED FERTILIZER IS ORDERED—elevator transports it to mixer. TL-6 makes hairpin turns into and out of the various bins for the different kinds of fertilizer.

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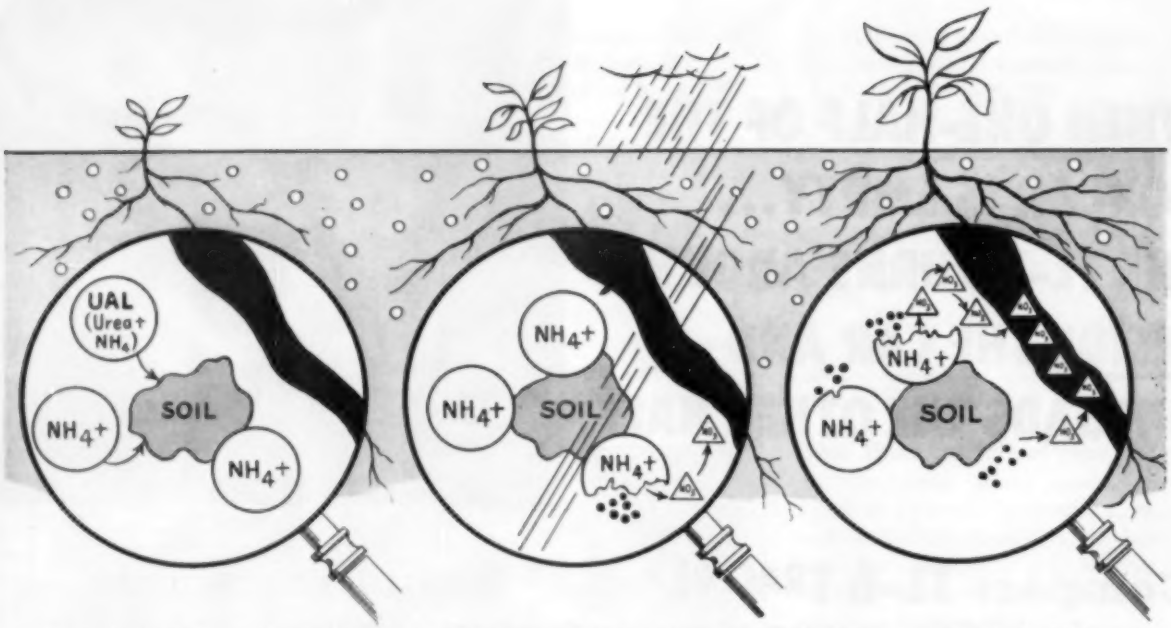

1. Du Pont UAL provides fertilizer mixtures with urea and ammonium nitrogen. In the soil, urea quickly converts to ammonium nitrogen, which attaches to the soil particles.

2. This ammonium nitrogen resists leaching. Nitrogen is made available to the plants when soil bacteria convert the ammonium nitrogen to nitrate nitrogen.

3. Under normal growing conditions, the conversion of ammonium nitrogen to nitrate nitrogen occurs at about the same rate that growing plants demand this nutrient nitrogen.

How nitrogen from Du Pont URAMON® Ammonia Liquors resists leaching . . . nourishes crops to maturity

Fertilizers ammoniated with Du Pont UAL have extra sales appeal because they are composed of two highly efficient forms of nitrogen. These forms—urea and ammonium—supply nitrogen that nourishes plants at the rate required for maximum growth and yields.

Nitrogen from Du Pont UAL resists leaching—remains in the root zone where plants readily absorb it. Thus, on the basis of units of nitrogen actually available to plants, UAL is a very economical investment.

Four formulations are available, including UAL 37—a special composition that releases nitrogen even more slowly. For technical assistance and information on the solution best suited to your use, write Du Pont.

Here are other important advantages of Du Pont URAMON® Ammonia Liquors:

- Safe in granulation . . . no danger of flash fires and less stack. Gives firm, uniform, stable granules, best for storage and application.
- Won't corrode regular fertilizer manufacturing equipment, including ordinary steel and aluminum.
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- Suitable for either batch or continuous mixing.
- Prompt, dependable delivery enables you to schedule your production with confidence.

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Potash Co. Names Scroggs

The Potash Company of America, Carlsbad, N. Mex., has appointed Joseph P. Scroggs as sales representative for the Georgia-Tennessee territory. Mr. Scroggs is also covering the Florida territory in conjunction with Paul C. Ausley. He replaces J. Robert Mell, who has been transferred to the company's Washington office.

Mr. Scroggs was formerly with the Lion Oil Co. His present headquarters are in the Candler Building in Atlanta, Ga.

•

Named Marketing Specialist

William G. Hiett has been appointed by Marsteller, Rickard, Gebhardt and Reed, Inc., as agricultural marketing specialist in the New York office.

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Oregon Weed Conference

The sixth annual Oregon Weed Conference will be held at Oregon Sate College, Corvallis, Ore., on Nov. 14 and 15.

The meeting will feature reports on new chemicals, the use of chemicals, and how farmers use herbicides.

•

N. E. Fertilizer Conference

Mason H Campbell, dean of the College of Agriculture at the University of Rhode Island, presided at the sessions of the New England Fertilizer Conference at the Bald Peak Colony Club, Melvin Village, N. H., Sept. 24 and 25.

"Factors Influencing the Use of Fertilizer in the Northeast," the results of a survey conducted by National Analysts, Inc., for the National Plant Food Institute, were discussed by Moyle S. Williams, chief agricultural economist of the NPFI. A panel was held to determine "How New England Looks at the Study."

The panel included: Harry R. Mitiguy, agricultural economist, Federal Reserve Bank of Boston; Henry M. Hansen, associate director, Agricultural Extension Service, University of Connecticut; and Dale H. Sieling, Dean, University of Massachusetts.

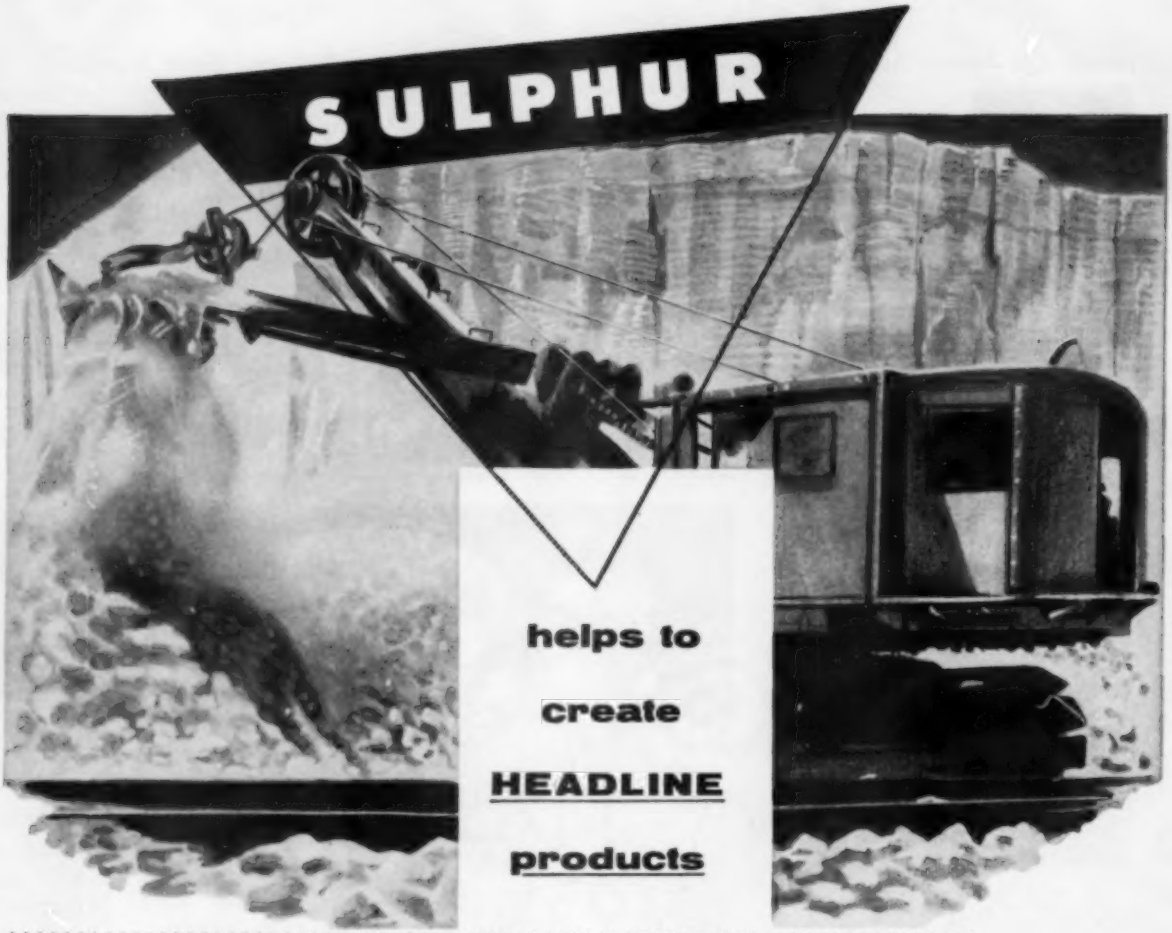
An afternoon panel discussed the "Use of the Study in New England." Dean Campbell presided and the panelists were: Roland A. Struchtemeyer, head of the department of agronomy, University of Maine; W. F. Henry, head of the department of agricultural economics, University of New Hampshire; and Winston A. Way, aronomist at the University of Vermont Agricultural Extension Service.

W. R. Allstetter, vice president of the NPFI, closed the general sessions with a talk in which he told how N.P.F.I. plans to use the survey on factors influencing the use of fertilizer in the Northeast.

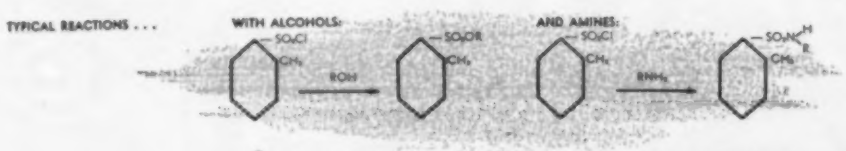
Diamond Sales Manager

Frederick H. Raedel Jr. has been named sales manager for consumer products by Diamond Black Leaf Products, a unit of Diamond Alkali Co., Cleveland.

Mr. Raedel will direct a marketing and merchandising program for the company's lawn and garden chemicals and other consumer products. Prior to joining the Black Leaf organization, Mr. Raedel had been retained as a marketing consultant for the past 12 months.



o-TOLUENESULFONYL CHLORIDE*



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Atlanta Fertilizer Meetings

Soil scientists and fertilizer industry representatives will meet in Atlanta, Ga., at the end of October to attend the annual Southeastern Fertilizer Conference and the annual Southern Soil Fertility Conference. Both sessions are slated for the Dinkler-Plaza Hotel.

The Southeastern Conference, sponsored by the National Plant Food Institute, will be held on October 31.

The Soil Fertility Conference, under joint sponsorship of the Southern Regional Soil Research Committee and NPFI, will follow on November 1. Both meetings are open to Institute members as well as college and USDA representatives.

A large part of the Southeastern industry session will be devoted to a discussion of the subject of what influences farmers in the Southeast to purchase fertilizer. This discussion will be based on a study being conducted for NPFI by National Analysts, Inc., of Philadelphia.

M. S. Williams, NPFI chief economist, will report on the Philadelphia firm's study. This will be followed by an appraisal of factors influencing the use of fertilizer in the Southeast by H. L. Dunton, head, Department of Agronomy, Virginia Polytechnic Institute, and Webster Pendergress, dean, College of Agriculture, University of Tennessee.

Russell Coleman, NPFI executive vice president, will speak at the session on the Institute's expansion program.

The Soil Fertility Conference on November 1 will open with a film entitled "The Bright Promise of the American Farm Market," which was produced by FORTUNE magazine.

A progress report on sulfur studies will be presented by H. V. Jordan, soil scientist, USDA and Mississippi State College; L. E. Ensminger, professor in soils, Alabama Polytechnic Institute; and J. A. Lutz, assistant professor of agronomy, Virginia Polytechnic Institute.

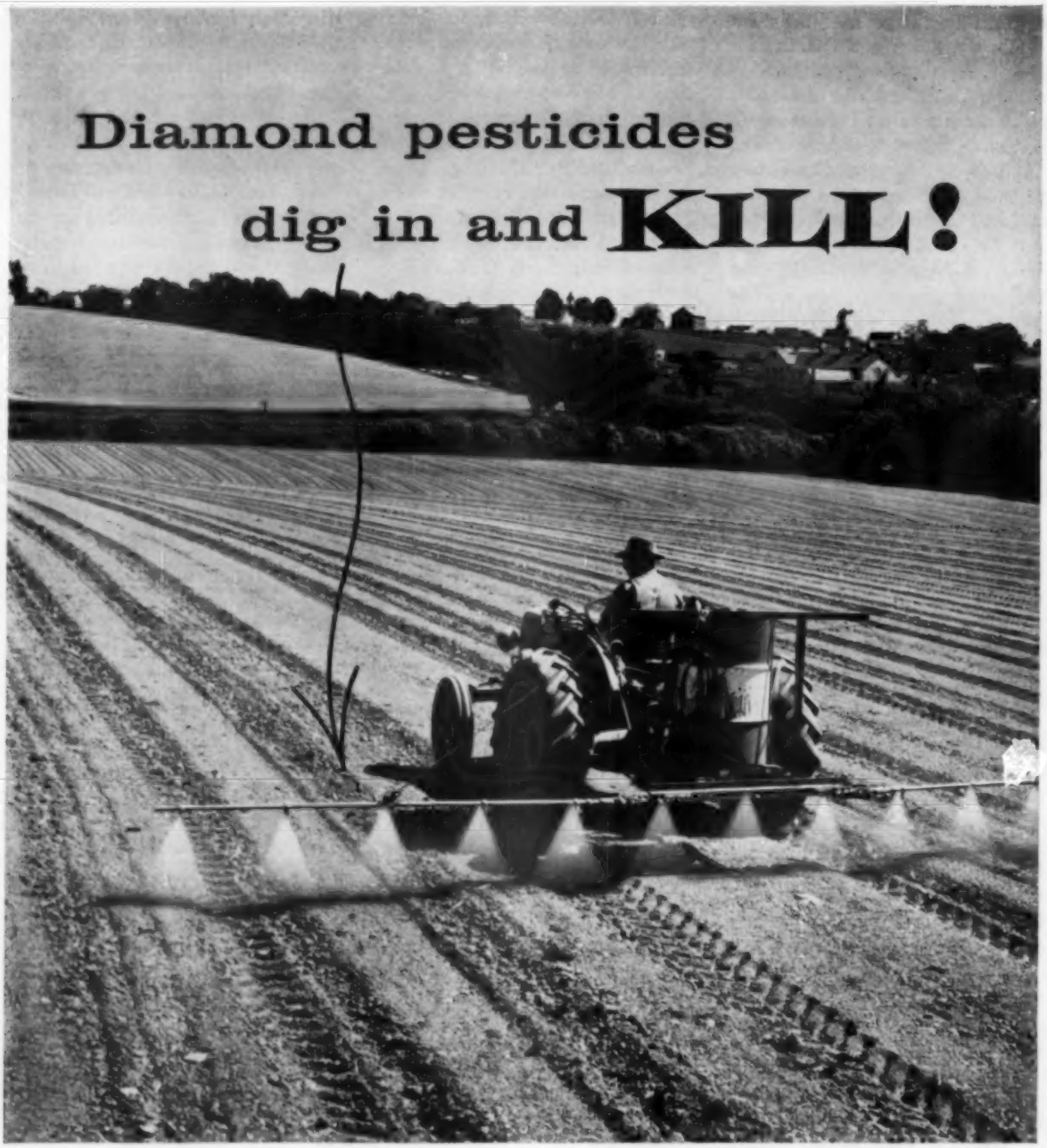
Highlights of the University of Georgia College of Agriculture soil fertility program will be discussed by Glenn W. Burton, chairman, Agronomy Division; H. F. Perkins, assistant research agronomist; J. B. Johnson, extension agronomist, J. W. Fanning, head, Department of Agricultural Economics, and Ralph Wehunt and P. J. Bergeaux, associate extension agronomists.

A grade-ratio report will be given by J. W. Fitts, head, Department of Soils, North Carolina State College, and J. G. Fiskel, associate professor of soils, Univ. of Fla., will present a report on trace elements.

Link-Belt Moving Plant

The Link-Belt Co., Chicago, has announced plans to move its new Los Angeles plant to 1200 Sycamore St., in Montebello, Calif., about 10 miles east of downtown Los Angeles.

The office, engineering department, district sales office, and factory branch store are included in the move. Production facilities are also being moved and are expected to be completed by Nov. 15. The new facilities are expected to double manufacturing capacity in Los Angeles.



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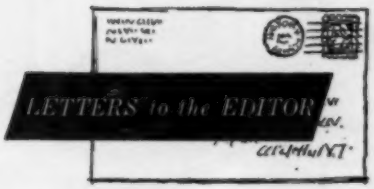

Gibberellin Producer

In the July, 1957, issue of *Agricultural Chemicals* an article appeared entitled "Gibberellin Tested for Use on Edible Crops," in which was listed the firms producing gibberellins. Not included in this list was Agricultural Biologicals Corporation of Lynbrook, N. Y., which has been producing gibberellins and marketing this product under the trade name of "Superellin" since March 15, 1957.

Thomas E. Gilmore
AGRICULTURAL BIOLOGICALS CORP.
Lynbrook, N. Y.

Comments on Soil Testing

I would be interested to know the source of information on which you based your statement pertaining to soil testing, page 55, of the August issue of AGRICULTURAL CHEMICALS. Anyone who has had sufficient experience with soil testing knows the implications of your statement are quite controversial. Theoretically they can be defended, but experience proves or disproves theories.

Frank App
SEABROOK FARMING CORPORATION
Seabrook, N. J.

Editor's Note:

The item on soil testing in the August News and Views Column reflects the attitudes of a host of authorities both in the U. S. A. and abroad. One of the chief sources of information on which the article was based is the survey on this subject issued in December, 1956, by the Organization for European Economic Cooperation (O.E.E.C.) titled, "The Organization and Rationalization of Soil Analysis." Other sources are the report by the Soil Test Work Group of the National Research Committee issued as Tech. Bul. No. 121, by the N. C. Agr. Expt. Station.

Excerpts from the various authorities follow which give a general picture of the status of soil testing in relation to fertilizer recommendations:

Dr. T. Walsh, Dept. of Agri., Dublin, Ireland:

"In the past there has been a tendency to regard soil testing as the end rather than as only one of the means of achieving balanced fertilizer treatment for a particular set of soil and crop conditions. Used against a proper background of scientific information, soil testing is a powerful tool in the hands of the advisory officer, to enable him to make a manurial recommendation designed to ensure an economic return from fertilizzer application and to allow at the same time of the maintenance of a proper nutrient regime in the soil while ensuring continued fertility. To take soil testing out of its proper perspective as an advisory tool and use it as the one and only basis of a specific recommendation, as is sometimes the case in direct laboratory-farmer contact, cannot but give disappointing results. Where this procedure is adopted soil testing can, as one might expect, easily fall into disrepute."

Dr. T. J. Ferrari and F. H. B. Vermeulen —Netherlands experts, whose two research laboratories make annually about 1,370,000 soil tests:

"The information obtained from soil testing possesses a relative value, partly because the result of analysis is no more than an estimate of the condition of the soil. . . . In spite of all measures that may be applied, results will always possess a certain degree of unreliability. Accordingly, the agricultural adviser should never regard the figures produced by soil testing as being absolutely infallible."

Prof. . A. Bondorff, State Laboratory on Soils, Denmark:

"The results of soil analyses, as found in the laboratories, are themselves without any value to farmers. . . . If the analysis is to be of any value to the farmer it must be possible to answer the questions in which he is interested. But this is only possible if a correlation between the results of field experiments and the results of soil analysts from these experiments exists. It is the fundamental idea of soil analysis that such a correlation exists."

The O.E.E.C. publication is recommended to anyone seriously interested in soil testing since it represents some of the most up-to-date thinking on the subject.

Dr. D. R. Hoagland, Calif. Agr. Expt. Station, Circular 367

"No simple method of analyzing a California soil is known by which the best fertilizer applications, or the suitability of the soil for a certain crop can be reliably predicted. Many factors must be considered with the aid of knowledge of local experience, such as has been gathered by the farm advisor. Furthermore, it is exceedingly difficult to take a small sample of soil which properly represents a large area.

"Any possible future development tending toward a more general application of chemical tests to soils must be the result of comprehensive, controlled experiments with different crops, as well as of a more critical study of field experience than it has yet been possible to make in most parts of the state."

Dr. J. Fielding Reed, Amer. Potash Inst.:

"For any chemical test to be helpful in predicting fertilizer and lime needs, one would expect the extracting solutions used in the test to simulate plant roots in their ability to obtain nutrients. This is, of course, difficult because this ability varies among plants and even within a plant as the growing season progresses."

Dr. R. G. Hemingway, J. Agr. Sci., 1955, 46, 1):

"The economic value of soil analysis is much more questionable on fields of higher fertility where fertilizers have been used recently."

From all the evidence it seems "that fertilizer recommendations based upon analyses of soils must be regarded as very rough approximations, and never as precise prescriptions to be slavishly followed." Prof. G. W. Robinson, formerly in charge of the national soil surveying program in England and Wales, once declared that soil analysis, including its specialized interpretation, could not predict with more than 70% chance of being correct; and moreover the chance of inaccurate prediction was greater for soils of medium fertility, but smaller for those in the "high" or "low" classes—cases in which guidance as to fertilizer usage is needed the most.

Perhaps excessive publicity has been and is being given to soil analytical methods and too little to their limitations. Any method that is based on 70 percent truth is certainly not precise.

Vincent Sauchelli
Baltimore, Md.

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Statement of ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233).

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5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

Signed—Eleanore Kanar, Editor

Sworn to and subscribed before me this 19th day of September, 1957.

(SEAL) David Tryon
(My commission expires April 12, 1959).

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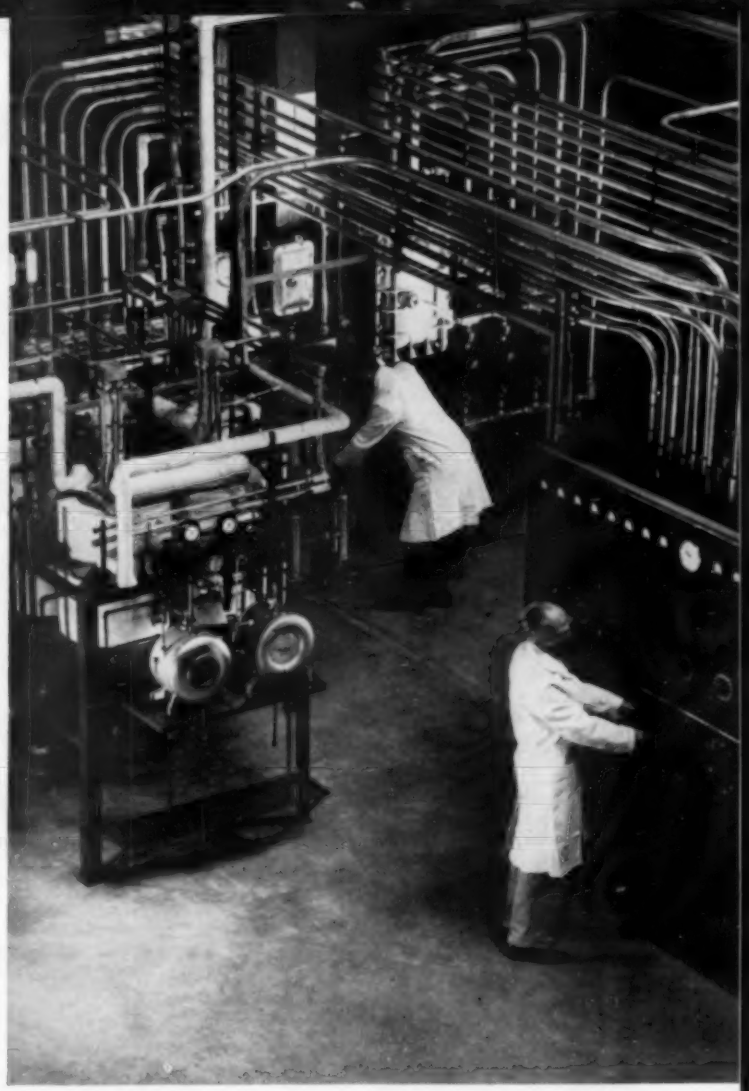

MOST PILOT UNITS at The Center are put together from standard "building blocks." Skid-mounted charging units such as the one at left hold tanks, heaters and pumps for transfer and metering. Process equipment, here shown in background center, can be widely varied. At right is electrical control cabinet. All switches, relays and controls not housed in explosion-proof boxes are enclosed in cabinets like this one, pressurized with outside air to exclude process vapors.

ANALYSIS OF MATERIALS processed and produced in pilot operations at The Center is an important part of the work carried out by Lummus engineers. Here a laboratory technician determines the composition of a multiple-component gas, using a gas chromatography technique.

Equipment, Supplies, Bulletins

Tech. Bulletin on "Gibrel"

Merck & Co., Rahway, N. J., have just issued a booklet on the gibberellins, with particular reference to Merck's "Gibrel," discussing agricultural and horticultural uses, summarizing responses of various crops to treatment with the gibberellins as reported in research to date, and listing analytical methods. The booklet also includes an exhaustive bibliography, with abstracts of 188 papers that have been published on the subject of the gibberellins. Copies are available on request.

•

New Grace Urea Product

The Grace Chemical Co., division of W. R. Grace & Co., New York, has developed a new micro prilled urea feed compound which is free-flowing and non-caking under normal storage conditions.

The first shipment of the product was made last month from Grace's Woodstock, Tenn., plant to the Ralston Purina Co. Developed last spring, the micro prilled urea feed compound has been successfully used in plant scale tests with a wide variety of feed materials.

•

To Produce Ethyl-Parathion

The Velsicol Chemical Corp., Chicago, has announced that it will start to produce Parathion (ethyl) at its Memphis, Tenn., plant in November. At that time, Methyl-Parathion operations will be transferred to Memphis.

In addition to the plant at Memphis, Velsicol maintains a plant at Marshall, Ill.

•

Centrifugal Pumps Brochure

The Allen-Sherman-Hoff Pump Co., Wynnewood, Pa., has issued technical data brochure No. 357, describing the company's hydroseal, centriseal, and packless pumps.

The new brochure replaces tables of figures with simple nomographs and charts as easier aids in selecting the proper types and sizes of pumps. It is intended to assist manufacturers in solving fluid-solid pumping problems and also presents advice on proper construction of sump chambers.

•

Acme Spec Mask

The Acme Protection Equipment Co., South Haven, Mich., is offering a bulletin describing the company's recently introduced "Spec" mask which is designed for gas mask users who must wear eye glasses under their masks. The literature covers the operating features built into the mask to accommodate the spectacles.

•

Penick Dealer Aids

S. B. Penick & Co., New York, is offering an attractive and colorful silk-screened counter card designed to help dealers display Thram, Penick's new anti-picking spray for poultry. Developed by Penick and tested at a leading university, Thram stops cannibalism in poultry within 24 hours effectively and economically.

Printed in three colors, the 10 x 18 display features built-in receptacles which hold a quart can of Thram as well as information leaflets for distribution to consumers.

Offering Pure Isomers

Ames Laboratories, Inc., South Norwalk, Conn., is offering pure isomers for fine chemical, pharmaceutical, and research purposes. The following primary amines are now available in pilot plant lots in their pure state: PARA-Methyl Benzylamine, ORTHO-Methyl Benzylamine, META-Methyl Benzylamine, PARA-Chlorobenzylamine, ORTHO-Chlorobenzylamine, 3,4-Dichlorobenzylamine, 2,4-Dichlorobenzylamine, ISO-Amylamine, M-Nonylamine, and M-Heptylamine.

All are colorless liquids and there are no secondary or tertiary amines present.

•

Tomato Disease Control

The Rohm & Haas Co., Philadelphia, is distributing a full color leaflet picturing and describing some of the most damaging tomato diseases and listing control measures designed to help the commercial grower of tomatoes protect his crop.

These control measures are based on the company's maneb fungicide, Dithane M-22. The diseases whose effects are illustrated are late blight, early blight, anthracnose, Septoria leaf spot, and gray leaf spot.

•

Marion Laboratory Mixer

The Rapids Machinery Co., Marion, Iowa, has introduced a new Marion Laboratory Mixer designed for use in the laboratory or as a production machine.

The mixer is a compact unit that features the same cross-blending action found in the company's larger standard and industrial units. It has an overall length of 36 inches, a width of 19 inches, and stands 34 inches high. The mixer has a capacity of approximately 50 pounds.

•

Sprout-Waldron Bulletin

Sprout, Waldron & Co., Inc., Muncy, Pa., has published a twenty-page bulletin describing the company's processing equipment.

The booklet, Bulletin 178, lists the complete lines of all types of processing equipment and tells about the engineering, manufacturing, and

research facilities available at Sprout-Waldron. Also included are installation photographs, references to special applications, lists of materials handled, and equipment as well as complete systems which have been engineered and built by Sprout-Waldron.

•

Diamond Chemicals Booklet

The Diamond Alkali Co., Cleveland, has published the fifth edition of The Story of Diamond Chemicals, a 34-page, illustrated booklet describing Diamond's family of chemical products for agriculture and industry.

The revised and enlarged edition presents a panoramic picture of the basic materials, their principal applications, and their production in a style aimed at both technical and non-technical readers.

•

Fume Scrubber Bulletin

The Schutte and Koerting Co., Cornwell Heights, Pa., has published a bulletin describing the company's scrubbing equipment and explaining how the different types are used in scrubbing fumes which may consist of solid particles, liquid particles, or gases.

The scrubbers are stocked in a number of sizes and in such materials as cast iron, rubber lined with rubber nozzle, Haveg and Stoneware. They also can be covered with plasticized polyvinyl chloride when slated for corrosive service.

•

Boom for Loading Containers

A handling boom for loading of bulk material collapsible containers has been introduced by Clark Equipment Company's Industrial Truck Division. The attachment fits all of the manufacturer's new Clarklift line of lift trucks.

•

German Tubo Mill

Ludwig Pallman K.G., Zweibrucken, Germany, describe the Pallmann Turbo Mill in a new 4-page bulletin. The mill is recommended for the potash and fertilizer industry, for breaking up, granulating, pulverizing, dry-crushing, mixing, etc.

•

Exact Weight Checkweighter

Exact Weight Scale Co., Columbus, Ohio, will display at the annual chemical exposition in New York City, Dec. 2-6, its new automatic weighing machine, the Selectrol Model #1250. The unit has a 100 pound capacity, heavy duty case and bag checkweigher.

Two other units to be shown at the exhibit will be the Basic Weight Classifier, and the Shadograph industrial scale.

•

Eastman Film on TEPP

The significance of insecticide formulations incorporating tetraethyl pyrophosphate, commonly referred to as "TEPP" and being produced by many leading insecticide manufacturers, is portrayed in a short motion picture film produced by Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Company.

The film was originally produced in 1956, and subsequently withdrawn for revision. The new version shows how TEPP formulations destroy insect pests along with approved methods of application. It is available to educational institutions, vocational and agricultural teachers, county agents, and other interested farm groups from Eastman Chemical Products, Inc., 260 Madison Avenue, New York 16, New York under the title "The Case of the Disappearing Poison."

•

Calculator For Fertilizer Trade

A new type of calculator has been designed by the Phosphates and Nitrogen Division of American Cynamid Co., New York, as an aid in determining quantities of phosphatic materials to be added when formulating various grades of mixed fertilizers.

The calculator is being distributed by the division's field personnel, and can also be obtained by fertilizer manufacturers on request to the Phosphate Department, American Cyanamid Company, 30 Rockefeller Plaza, New York 20, N.Y.

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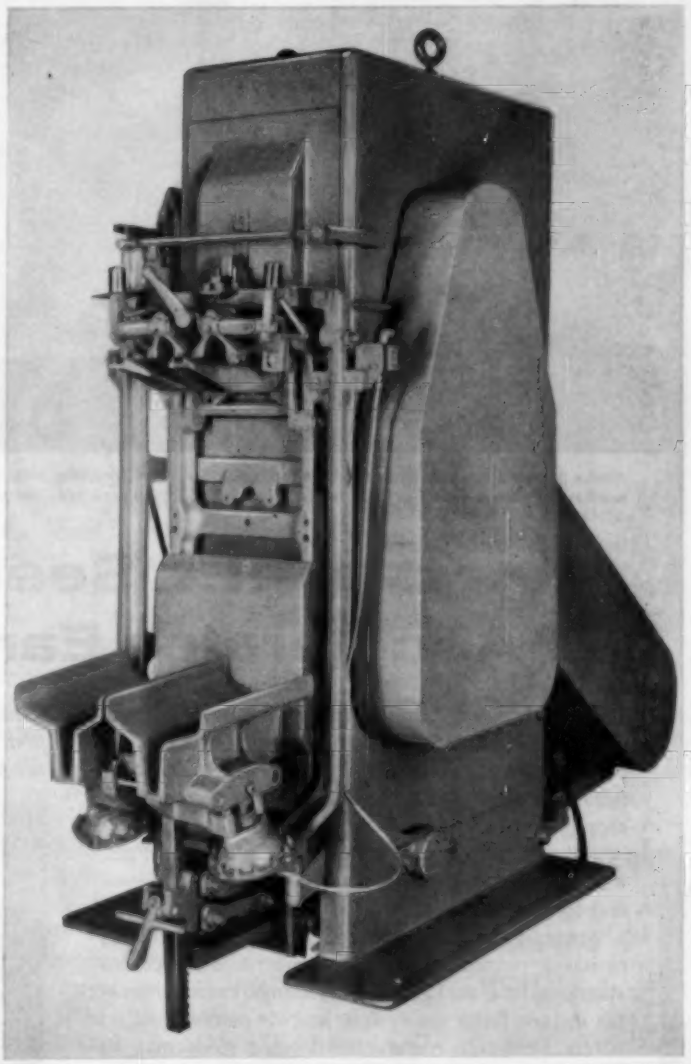
St. Regis packers, such as the new 161-FB, have rendered service to the fertilizer industry for over a quarter of a century. But don't forget St. Regis has seven bag plants manufacturing sewn and pasted, open mouth and valve multiwall paper bags.



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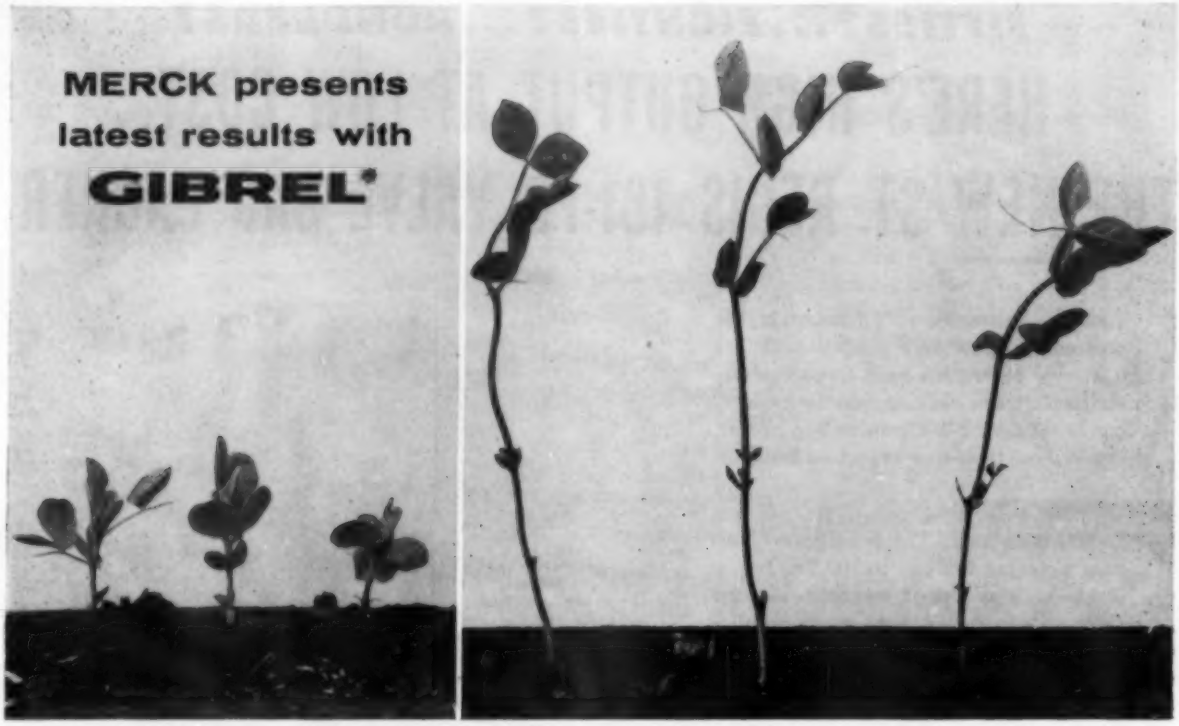

Alaska pea seedlings from untreated seeds are too small to cultivate, too short to shade weeds.

Seed treatment with GIBREL brought seedlings up three days earlier, made them grow tall above weeds.

New GIBREL Seed Treatment Accelerates Early Growth

The Merck experimental program for GIBREL is now in full swing, building a solid foundation for the future possible uses of this new plant growth stimulant. Carefully controlled Merck-sponsored studies in important crop-growing areas across the country indicate promising results from seed treatment with GIBREL. Peas, beans, soybeans, cotton and sugar beets all show good response when seeds are treated with a slurry of GIBREL.

According to all reports, seed treatment with GIBREL causes a prompt and uniform emergence, excellent stand and increased growth of seedlings. Practical benefits include faster emergence, making plants come up before weeds. In many cases treated seeds may be planted earlier and crops marketed sooner since plants respond to GIBREL even in cold, wet soils and with low temperatures.

Although these uses look promising, specific recommendations for use of GIBREL in food and feed crops will be published when complete experimental data are available.

*GIBREL is the Merck trademark for gibberellin plant growth substance.

Keep up to date with news about GIBREL *by looking first to* MERCK, *pioneers in gibberellin research and production.*

Comparison of Alaska pea growth three weeks after a cold, wet spring planting. Treatment with GIBREL (½ pt. medium strength slurry per 100 lbs. seeds) caused seedlings at right to emerge faster, have better stand than control seedlings at left. Photo taken at DeForest, Wis. trial fields of the Oconomowoc Canning Company.

GIBREL – a product of MERCK

MERCK & CO., INC. Rahway, New Jersey

BREVITIES

HI PLAINS DEHYDRATING CO., a newly incorporated Dodge City, Kansas, firm, has announced plans to build a fertilizer plant. The company will manufacture, dehydrate, and process agricultural products.

AC

FARMER'S EXCHANGE, INC., Franklinton, La., has been granted a Mississippi permit to manufacture and sell fertilizers, feed, and seeds.

AC

MID-AMERICA CHEMICAL TERMINAL, a new subsidiary of DeMert & Dougherty, Inc., Chicago, has purchased the Chicago plant of U. S. Industrial Chemicals Co., division of National Distillers & Chemical Corp., New York. U. S. I. has concentrated its activities at its expanding Tuscola, Ill., plant.

AC

DR. JAMES G. HORSFALL, director of The Connecticut Agricultural Experiment Station, has been appointed to the Advisory Committee for Biology and Medicine of the Atomic Energy Commission by Chairman Lewis L. Strauss.

AC

DR. ELMER T. PALM, former graduate research assistant at Boyce Thompson Institute and Oregon State College, has joined the staff of the Crop Protection Institute as research plant pathologist. Located at the Durham, New Hampshire, laboratories of the Institute, Dr. Palm will be directly concerned with investigations of fungicidal modes of action, chemotherapeutic research, and nematocidal investigations.

AC

DR. WALTER E. DOVE, director of entomological research of Fairfield Chemical Division, Food Machinery and Chemical Corporation, New York, delivered a report on "Piperonyl Butoxide and Pyrethrins Officially Endorsed for Use on Stored Products in the U. S. A." at the International Crop Protection Conference in Germany September 10.

•

A FIVE PERCENT DOLLAR SALES RISE for chemicals and allied products was predicted for 1958 by John O. Logan, vice president and general manager of the Industrial Chemicals division of Olin Mathieson Chemical Corporation. He addressed the fifth annual marketing conference of the National Industrial Conference Board in New York, September 19.

AC

THE POTASH COMPANY OF AMERICA, Carlsbad, N. Mex., has reported a net income of $2,915,011 or $2.62 a share for the fiscal year ended June 30. Net income the year before came to $2.61 a share on a smaller number of shares outstanding.

AC

THE FARMERS GRANARY, Patterson, Ark., has announced that a new liquid fertilizer manufacturing plant is being built at Patterson and will be ready for production this Fall.

AC

THE VIRGINIA-CAROLINA CHEMICAL CORP., Richmond, Va., has declared a dividend of $1.50 a share on the 213,053 shares of 6 per cent cumulative participating preferred stock in the corporation. The dividends are payable Oct. 1 to holders of record Sept. 11.

AC

THE UNION BAG-CAMP PAPER CORP., New York, received the Grand Award in the annual competition run by the Direct Mail Advertising Assn. at the association's convention in New York, Sept. 11.

AC

T. J. MAHONEY has been named sales manager for the Havana, Cuba, branch of the American Agricultural Chemical Co., New York.

FOURTEEN fertilizer plants of the American Agricultural Chemical Co., New York, have reported perfect safety records for the past six months.

GIBBERELLINS

(*From Page* 37)

of antibiotics such as penicillin or streptomycin. Liquid medium, containing a carbon and nitrogen source, and sources of minerals is sterilized with steam in large fermentation tanks. The organism is introduced into the tank and the culture is stirred continuously. Sterile air is bubbled through the medium to provide the oxygen necessary for growth.

After the culture has grown from three days to three weeks, it is fractionated. Most of the fractionation scheme stems from that of the University of Tokyo workers. First, the culture is filtered to remove the solids, including the mycelium of the fungus. The active material is then adsorbed on charcoal, and is eluted with basic methanol. This extract is evaporated, the residue is taken up in bicarbonate, extracted with ether, the aqueous layer acidified, and gibberellin taken from the aqueous layer with ether, from which it is crystallized. For the most part, the equipment for the production of antibiotics suffices for the production of gibberellic acid. There are no longer any production problems, and gibberellic acid is now commercially available by the ton.

In the fractionation and study of any biologically active material, an assay for potency is important, of course. We are at present studying and use a number of chemical assays for gibberellic acid. We also use a plant response test with pea seedlings. The sample to be assayed is put on pea plants that have just emerged and, after a period of time, the height of the plants is measured to get an assessment of the activity.

There is no doubt that in the gibberellins we have important new growth regulators that should enable us to learn more of the physiology of plants. It has been shown, for example, that in some plants substances resembling the gibberellins oc-

cur naturally. These are very likely important for normal growth. Such basic information will have indirect value in world agriculture. The question now, though, is: Will gibberellic acid, now that we have adequate sources, achieve a direct use for the production of more, or better plants?

There is already demonstrated an undoubted utility in the production of certain greenhouse and field flower crops. Some gibberellic acid is being sold to the home owner for flowers, shrubs, and lawns. These areas of use will expand. This leaves a consideration of major uses in the food, feed, fiber and wood industries.

At this early stage of the study of the gibberellins, no assured major crop use can be noted. Gibberellic acid has been available for experimental purposes in reasonable amounts for but a year, and a longer period will be required before important answers are known. The best that can be done now is to indicate areas that appear to us to offer the best possibilities for major utility. We make these suggestions on the basis of what we have learned of the results and views of a number of investigators, and on the basis of our own research work.

A most promising use for gibberellic acid, it seems to us, is to take advantage of the fact that gibberellic acid alters the response of plants to temperature and to light. A great many plants have specific temperature requirements for normal development. An example I have cited is chrysanthemum. The production of seed by biennials is another. Gibberellic acid is capable in some plants of extending the growing season or otherwise altering the time at which particular stages of the life cycle are reached. It has been suggested seriously by several scientists that the geographical area in which a crop can be grown might be extended through the use of gibberellic acid.

A second real possibility is the increasing of yields of the vegetative parts of plants used for animal feeds. These include annual and perennial forages, hay, and silage. Out-of-season growth might be especially useful.

Right now we are less optimistic about the eventual usefulness of gibberellic acid for increasing the yields of our annual seed crops, such as wheat, corn, oats, and soy beans, by treating these crops during the growing season. More will be learned about this subject at the end of the present season, however. Similarly, more work will be necessary before we will know if seed treatments will be useful on a wide scale. Results noted to date on major crop plants are equivocal. If observations that gibberellic acid is capable of speeding germination in cold ground can be extended, there would appear to be good possibilities for extensive seed treatment use.

A successful agricultural chemical must produce a sizeable gain for the grower above the cost of the chemical and its application. At the present price of gibberellic acid, about $4500 per pound at producer level, many potential uses would seem to be eliminated. However, gibberellic acid possesses great potency on some plants, so the price per pound is not a good yard stick. Also, if gibberellic acid follows the trend of most other fermentation products as it certainly will, we shall see a rapid drop in price as soon as volume use is achieved.

Having ventured to make these statements, I must hastily add that I am quite fully prepared to withdraw or to modify what I have said. The question of the wide-spread use of the gibberellins in the major crop plants is not yet settled. Research is just beginning, and the gibberellins are a versatile group of plant growth regulators.★★

CACA MEETING

(*From Page* 41)

ficient to settle for 80-90% control. The law of diminishing returns is a factor to be dealt with in sterilant usage for often two to three times as much material may be required for 100% control as needed for 80% control.

The speaker reviewed the general characteristics of some of the common groups of soil sterilants, including the arsenicals, sodium chlorate, the borates, and urea herbicides.

Arsenicals he noted are long-lasting and highly toxic. One of the most striking characteristics of the arsenicals is the exceedingly strong fixation that accompanies their use. On fine-textured soils considerable amounts of arsenical sterilants are fixed near the surface and very little leaching takes place; although in coarse-textured soil there is more leaching and the sterilant effect does not last quite as long. Loss of activity due to decomposition is not a factor with arsenicals, the greatest loss coming through fixation in irreversible reactions and to some extent by leaching in coarse-textured soils. The most serious disadvantage of the arsenicals is their extreme toxicity to animals. They are not recommended for use on agricultural land because of the long residual effect and because of danger to farm animals. Their best field, the speaker suggested, is in enclosed areas around industrial sites where they may be safely employed by experienced workers to effect permanent soil sterilization.

Sterilants based on sodium chlorate leach readily, which results in their being quite effective for the control of deep-rooted weeds. Decomposition of the chlorate ion is a major factor in determining the length of residual effectiveness. Most weeds can be killed by sodium chlorate. Because the product is effective on deep-rooted weeds and because its activity is usually lost in one to two years due to leaching and decomposition, it has been widely used for spot treatment of noxious weeds on agricultural land. Sodium chlorate is not particularly toxic to animals unless it is taken in excessive amounts. It is however, somewhat corrosive and there is a serious fire hazard involved, so that it cannot be recommended for use around buildings, lumber yards, storage tanks, etc. Additives such as borates, sodium acetate, sodium carbonates and calcium chloride may be mixed with sodium chlorate to reduce, although they do not eliminate, the fire hazard.

Borate sterilants are available in numerous forms with different solubilities and varying boron content. A unit of boron trioxide has about the

same inherent toxicity for plants as a unit of sodium chlorate when taken up by the roots. Fixation occurs on neutral and alkaline soils, but not on acid soils. It tends to be greater on fine textured soils and where organic matter is high. On some soils, fixation tends to prolong the residual effect of the borates. Borates leach fairly readily so if adequate water is present, deep-rooted perennial weeds may be controlled. Decomposition is not a factor in loss of activity with borate sterilants. There are wide variations in the tolerance of different plant species to boron. Grasses in general are not killed as readily as other broad-leaved weeds. The borates are non-corrosive, non-toxic, and offer no fire hazard. They are available in a granular form which facilitates dry application. Their chief disadvantage is that quite large amounts are required for complete sterilization and grasses are not readily controlled.

The substituted urea herbicides are firmly fixed in the top most layer of soil and are relatively insoluble in water. They are remarkably resistant to decomposition and to leaching. Thus they provide a long residual effect. However, because of the same properties they are not as effective as deep-rooted perennials for they do not move down into the lower layers of soil. They are somewhat slow in action, for the material has to get down into the soil and be taken up by the plants. They are non-toxic, non-corrosive and offer no fire hazard.

A New Miticide

A RELATIVELY new and very effective miticide was discussed in a talk by Gordon A. Brandes of Rohm & Haas Company, Philadelphia. Kelthane has been found to provide effective control of a wide range of mite species and it is particularly interesting that it effectively controls mite populations which have developed resistance to the organic phosphates and other miticides. Also of particular note is the fact that Kelthane is essentially non-toxic to insects, including honey bees, and relatively non-phytotoxic, making it quite safe for use on a wide variety

of crops under most environmental conditions.

The speaker also indicated that Kelthane which is available as a wettable powder, an emulsion concentrate and in dusts, possesses rapid initial killing action together with exceptionally long-residual effectiveness. It is highly toxic to motile forms of mites and is ovicidal to some species. It has a comparatively low order of mammalian toxicity.

The product was tested in 1955 by many of the state and federal experiment stations in the United States and Canada. Commercial usage of Kelthane began in the Fall of 1955 on greenhouse roses and other flowers. Approximately 100 experiment station and 400 supervised grower tests on 30 different crops were conducted in all parts of the United States during 1956. During these trials the product effectively controlled 21 species of mites. During 1957 substantial quantities of Kelthane were used commercially on apples, pears, citrus, stone-fruits, strawberries, cotton, seed alfalfa, beans, almonds, hops, sugar beets, shade trees and greenhouse flowers. Kelthane was the subject of an article in the July, 1956 issue of *Agricultural Chemicals*.★★

INFLUENCING FARMERS

(*From Page* 32)

munity, and has many contacts outside the community. He gets his information concerning new practices from colleges and agricultural agencies.

The next group, the early adoptors, are usualy younger than the innovators, usually younger than the average farmer, have more education, and receive more magazines and bulletins. The majority of early adopters tend to be persons of high morality and sound judgment and are informal leaders of the community.

The largest group, the majority, are older, with less education than the early majority and attend fewer agricultural extension meetings. The final group, the non-adopters, are the oldest residents and have the least education and outside contacts.

In summarizing the categories of people who adopt practices, Dr. Beal and Dr. Bohlen pointed out that as you move up the groupings, from non-adopters to innovators, the number of contacts or acquaintances the farmer has increases correspondingly.

They also stressed that it takes a long time for everybody to become aware of an innovation. The further away you get in time from the origin of an idea, the more people depend on neighbors and friends for their information. With this in mind, they recommended that consumer advertising campaigns to introduce new products should be planned to last for many seasons, rather than for one as tends to be the practice now.★★

AMER. PHYTOPATHS

(*From Page* 55)

only one part of cytovirin in each million parts of water. Against tobacco mosaic, cytovirin was completely effective although the spray concentration was reduced by half—to 0.5 parts per million of chemical.

Fungus on Watermelons

One cause of "pimples" on the outer skin of watermelons is the fungus disease, powdery mildew. S. S. Ivanoff of Mississippi State College, who identified the disease, also determined in preliminary tests that it might be controlled in the field with Karathane, and perhaps with other fungicidal chemicals. Dr. Ivanoff said that the pimple disease begins as typical powdery mildew spots on the rind of young fruits. Within a week or 10 days the mildew spots give way to raised spots or pimples.

Soil Treatment for Peach Virus

H. Keith Wagnon and Jack A. Traylor reported that they successfully freed orchard soil of the mosaic virus by steam treatment and by use of such chemical soil fumigants as Nemagon, carbon bisulfide, methyl bromide, D-D mixture, and Vapam. It is likely that from this beginning practical treatments can be developed that will allow commercial peach and nectarine producers to reclaim soils now contaminated with the peach yellow bud mosaic virus.

Grapes and Pierce's Disease

Repeated failures in establishing bunch grapes in Florida—dating back as far as the French, Spanish, and English colonists and as recently as 1920—now have been definitely tied to the presence of the virus of Pierce's disease in that state, according to James M. Crall and L. H. Stover, Florida plant pathologists. The two scientists established three species of leafhopper as carriers of the disease—capable of transmitting the disease from an infected to a healthy grape plant. They identified the leafhoppers as *Oncometopia undata, Homolodisca triquetra,* and *Carneocephala flaviceps.* These three insects are also carriers of phony peach virus of peaches.

Tobacco Mosaic Virus Inhibited

Chemical inhibition of the tobacco mosaic virus disease in laboratory experiments, representing a significant advance toward the practical control of this and possibly other virus plant diseases, was reported by University of Wisconsin scientists Ralph H. Kurtzman, Jr., Albert C. Hildebrandt, and A. J. Riker and biochemist Robert H. Burris.

In experiments conducted under controlled laboratory conditions, tobacco mosaic virus was inhibited in plant tissues by treatment with two different but related compounds—6-methylpurine and 6-chloropurine. In individual tests, these organics, which are nucleic acid derivatives, provided 95 and 89 per cent virus inhibition, respectively.

The 6-methylpurine treatment was particularly outstanding, because it resulted in virus inhibition at extremely low chemical concentrations without toxic effect upon the tobacco plant tissue. As little as one part of active chemical in 100 million parts of carrier resulted in significant disease inhibition. The scientists found that this concentration could be increased 25 times before tissue damage occurred. The 6-chloropurine was inhibitive at concentrations of 15 parts per 100 million, but tissue damage occurred with dosages above 10 parts per 100 million.

ACS MEETING

(*From Page 35*)

comes saturated. The increase, however, is less than would be expected. The addition of 100 pounds of ammonium nitrate increases the liquid phase only 83 pounds.

A study of the effect of ammonium sulfate on a system saturated with K_2SO_4-$NH_4H_2PO_4$-NH_4NO_3-NH_4Cl at two and four per cent water showed that the liquid phase of this system decreases as the ammonium sulfate content is increased. This decrease in liquid phase may be due to the formation of a double salt between ammonium sulfate and ammonium nitrate.

Although there is little place for generalizations in solving problems encountered in granulating mixed fertilizers, a study on the liquid phase relation of a number of complex salt systems will aid in explaining many of the observed differences in storage and handling characteristics of various granular mixed fertilizers.★★

DERMATOBIA HOMINIS

(*From Page 51*)

mg/kg the kill was 81.3 percent in 14 head of cattle harboring a total of 112 bots.

In all cases where live bots were found following treatment, only the more advanced stages of the larvae were present, indicating a higher degree of efficacy against the young larvae.

Summary

In tests conducted in Panama with oral administrations of Dow-ET-57 to cattle for the control of torsalo, 72.6 percent kill was obtained with a single dose of 100 mg/kg of body weight. The young larvae were very susceptible to treatment, but some of the larger larvae were not killed.

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SPRAY PROGRAM

(*From Page 45*)

disease spray program. "Their livers were loaded with DDT." However, he was in favor of saving the elms.

"As far as we're concerned," he said, "elm trees make pretty good song bird habitat and it often is more important to save habitat even at the loss of birds or mammals. If you save the trees, the birds will come back."

The articles concluded with a call for more study of the pest control problem and said that economic necessity promises to bring about changes in pest control methods which will remove some of the hazards that arise from the use of chemicals.

Entomologists are haunted, the Journal said, by the specter of a superinsect that will thumb its nose at insecticides. Dr. Clarence Cottam was quoted as having said, "We know almost nothing of even the direct effects of many control agents on plants, animals, soils and soil organisms, and we know still less of the indirect, accumulative, and long time effects these controls have upon wildlife, plants, and even upon man."

More chemical research was called for along five lines: insect physiology and toxicology, mechanism and cause of resistance, systemics, attractants, and insect growth regulators.

Man, it seems, has merely been winning battles with insects, Mr. Lynch concluded. It will take an all-out campaign to win the war.★★

CAKING MECHANISM

(*From Page 39*)

Summary and Discussion

Caking of granular fertilizers resulted from bonding of granules by crystals of soluble salts that formed

on the surfaces of granules during storage. These salts often formed veneers or hulls that encased the granules. The compositions of the salts depended on the formulation used in making the fertilizer. The surface crystals apparently were formed by deposition from a liquid phase that migrated from the interior of the granules.

Decreasing the moisture content of granular fertilizer decreased the reaction and recrystallization of fertilizer components during storage with the result that the crystalline hulls that formed were thinner and denser, and caking was reduced or avoided.

Pile curing of granular fertilizers for seven days prior to bagging usually accelerated the reaction and recrystallization processes to such an extent that the formation of hulls was well advanced at the end of the curing period and caking did not occur in subsequent bag storage. Exceptions to this were some of the urea formulations cited, where seven days were grossly inadequate and conditioning or drying were more beneficial.

Coating granular fertilizers with a conditioner such as kaolin clay or kieselguhr prior to bagging reduced or prevented caking by promoting the formation of finer, more densely packed surface crystals that did not bond with similar crystals on adjacent granules. The formation of crystals at contact points was reduced. The surface hulls on conditioned granules formed almost entirely below the layer of conditioner.

These microscopic studies should stimulate further investigations of methods for preventing or reducing caking of granular fertilizers and suggest a direct investigative procedure.★★

FERTILIZER VIEWS

(*From Page 49*)

as a barrier. One lake was treated, the other was not. Plant and fish life in both the treated and check lake was not affected and the taste, color, odor and other properties of the water in both lakes remained unaffected. This gives the "go sign" to the use of this interesting chemical in the conservation of water.

Plant Food Losses Due To Irrigation

ORDINARILY, you would think that overhead sprinkling of a crop would have nothing but beneficial effects. Irrigation is becoming one of the most popular practices in agriculture. Eastern farmers, particularly, have learned through costly experience the folly of depending entirely upon rainfall.

But, now comes Dr. H. B. Tuckey, internationally known scientist of Michigan State University with startling news. Large amounts of carbohydrates as well as mineral nutrients can be washed out of plants by overhead irrigation systems. In a recent issue of *Science* (Vol. 126, p. 120, 1957) he reports on investigations carried out at M. S. U. which show that freshly manufactured carbohydrates can, during periods of intense sunlight, be leached from the foliage when the plants are sprayed or sprinkled with plain water or solutions. Apple foliage can lose as much as 1000 pounds of carbohydrates per acre in a single season. The newly made carbohydrates, for example, sugars, are readily soluble in water. It has been known to scientists, at least, that mineral nutrients could thus be leached from the leaves; that carbohydrates are also leachable is something new.

Many overhead systems are used in modern agriculture to irrigate or spray the crop. Dr. Tuckey's findings may cause many farmers to give overhead irrigation another look.

Here is a problem that should receive more study and evaluation on the part of state agricultural experiment stations and researchers in private industry. If such plant food losses occur during critical growth stages, serious loss in yields could result.

PROFESSIONAL DIRECTORY

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Rates for classified advertisement are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. *Check must accompany all classified advertisements.* Address all replies to Classified Advertisements with Box Number care of AGRICULTURAL CHEMICALS, P. O. Box 31, Caldwell, N. J. Closing date: 10th of preceding month.

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INDEX to ADVERTISERS

TALE ENDS

NAC held one of its most successful meetings at Spring Lake early last month with a record turnout, a well selected group of work-shop style talks, and unusually well attended business sessions. A pair of $50.00 attendance prizes may have been partially responsible. In any case, we were treated to the sight of a "Standing Room Only" session.

AC

We went down to Spring Lake prepared to find a lot of folks looking for a shoulder to cry on, but were pleasantly surprised to find a high percentage of the industry reporting a fairly satisfactory season. Six weeks ago the outlook seemed rather bleak, but apparently August was an excellent month for sales. With demand continuing into September, 1957 may be remembered as one of the best late-season-years in the history of the insecticide business.

AC

Such moist eyes as there were could perhaps be traced to the "Auld Lang Syne" atmosphere of a final meeting at the Essex and Sussex. Gone were the complaints about rooms, service, no breakfast after 9:30, etc., and the general feeling was often expressed "We're going to miss this place."

Just to clarify the Board's action, this is the reason for leaving the E and S as explained to us: A September meeting has long presented a lot of problems. Many are still busy with late-season activity . . . and as early as the first week in September, few are in a position to spare the time to leave their businesses. It is also much too early to evaluate the results of the current season business, and to make informed decisions affecting the season to follow. October seems like a much more logical month for an insecticide industry meeting. The E and S, however, because such a high percentage of its staff are college kids, closes early in September and is not available for an October meeting. Thus the decision to switch to a later season date automatically eliminated Spring Lake as a meeting site—The future meeting schedule now lines up as follows:

October, 1958 — The Bon Air in Augusta, Georgia

1959 — French Lick, French Lick Springs, Indiana

1960 — The Antlers at Colorado Springs, Colorado

AC

Highlight of the convention was the banquet address of the retiring President, Fred Hatch. In his opening, Mr. Hatch traced the early history of NACA. He then reviewed the complete list of products of the industry—from calcium arsenate and bordeaux down through the latest of the chlorinated hydrocarbons, phosphates and the dithiocarbamates. Following a slight digression to trace the invention of the wheel and to elaborate on the significance of the boll weevil in the Cotton South, Mr. Hatch concluded with a run-down on the following day's entries at Atlantic City. His audience agreed the talk was one of the most significant in the Association's history, and not a single listener had an opportunity to walk out before it was over.

AC

The National Plant Food Institute seems to be making some progress towards straightening out its current structure problems, and perhaps working out a solution which will lead to the Potash producers rejoining NPFI. A committee named to try to find an equitable basis for agreement met in New York early in September, and came up with a tentative plan which will be presented to the Board for their consideration at a meeting scheduled for Atlanta in November. We sure hope they have found an answer which will be acceptable to both sides, and lead the way back to a united fertilizer industry once more.

Announcing a New Agricultural Pesticide

DELNAV*

(Formerly Hercules 528)

*Trademark

After three years of extensive field tests, Delnav—a new phosphate pesticide—will be commercially available in limited quantities this year.

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Developed at Hercules' Research Center and Agricultural Chemicals Laboratories, Delnav has been evaluated by Hercules, the United States Department of Agriculture, and various state agricultural research laboratories. Among the insects it controls are leafhoppers, thrips, leaf miners, and mites of various types. The effectiveness of Delnav is shown by the fact that it not only destroys adults but also the eggs of mites.

Delnav will be available in dusts or sprays in the near future. Additional information on this new product can be obtained by writing to Hercules.

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